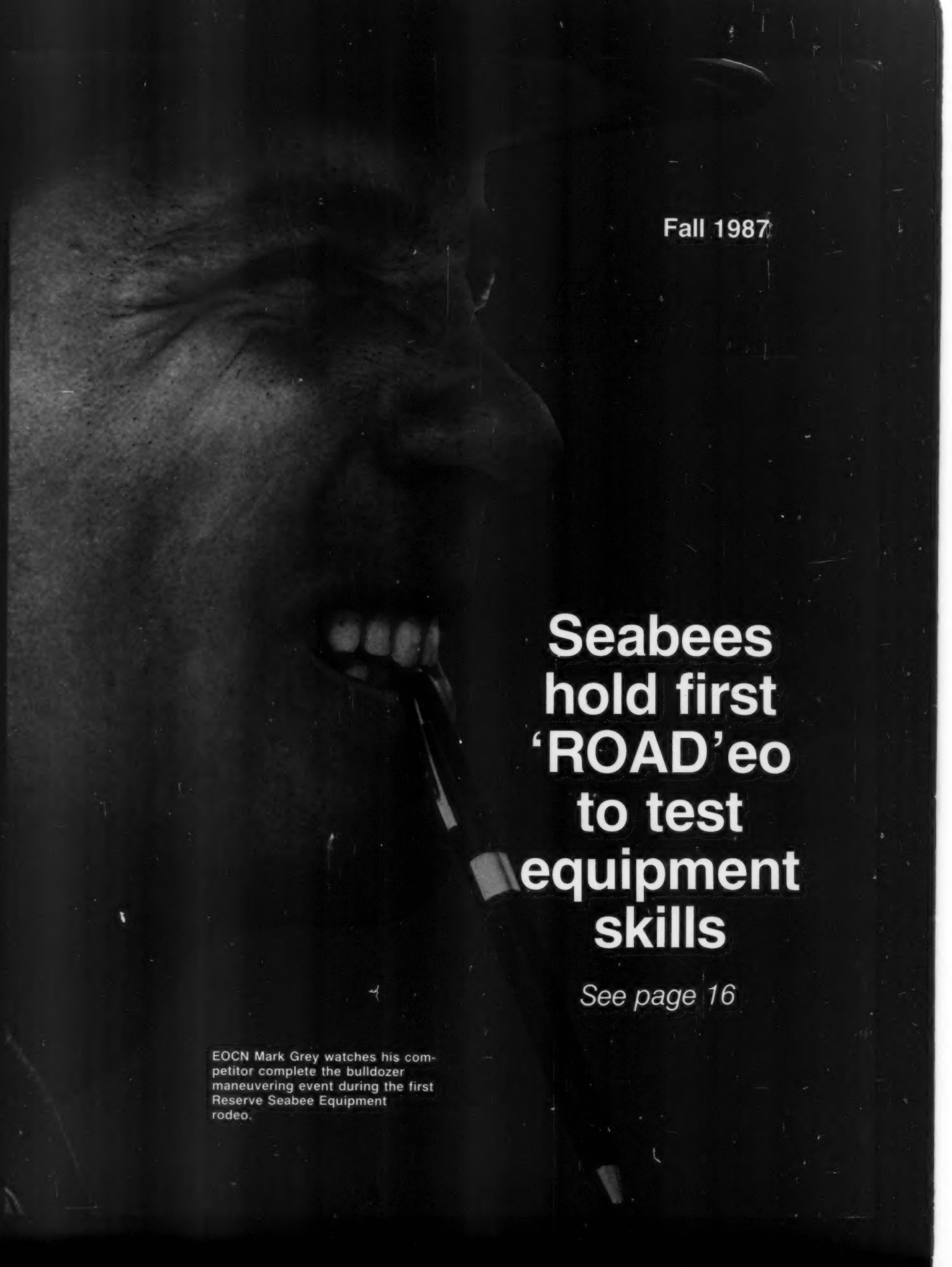
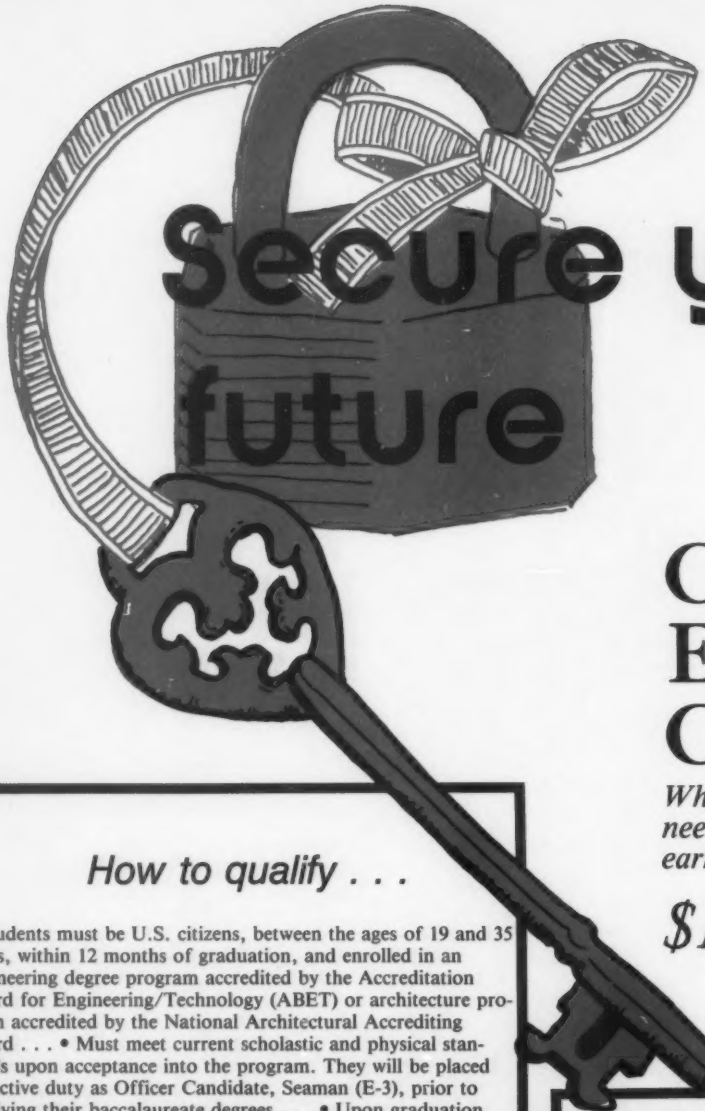


Fall 1987

Seabees hold first 'ROAD'eo to test equipment skills

See page 16

EOCN Mark Grey watches his competitor complete the bulldozer maneuvering event during the first Reserve Seabee Equipment rodeo.



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Seabee EOCN Mark Grey, proud competitor in the first-ever Navy equipment 'road'eo, is the subject of this issue's cover. Story is on page 16. Photo credit goes to LCdr. Gary McDonald.

NAVY CIVIL Engineer

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Navy contracts need network analyses

By LT S. T. ECKEL, CEC, USN
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CECOS, Port Hueneme, Calif.

Certain-sized Naval Facilities Engineering Command (NAVFAC) contracts require the use of the Network Analysis System (NAS) for scheduling of the contract. This system requires the contractor to prepare a critical path schedule. Experience has shown, however, that many contractors do not actually use this system to manage the project, but merely to satisfy a government contract requirement to receive monthly progress payments. While some may advocate not using NAS for project management because of this problem, NAS is a good project management tool if properly used in the field and the office. A description of the problem and recommended solution follows.

The specification section in a contract's general paragraphs usually requires a range of activity numbers for the NAS, say 600 to 1,000 for a $5 million single-facility contract. The contractor duly produces, or has someone else produce, an NAS for approval and submits it with invoices for payments. The catch is that he or she does not really manage the project with this tool, but with bar charts. While bar charts are useful, they do not provide the information (logic, time dependencies) available in an NAS.

Why does a contractor not use the NAS he or she prepares per the contract specifications (NAVFAC Guide Spec, NFGS, Section 01013)? One reason may be that the number of activities may make the network so cumbersome that activity delays quickly cause so much of the network to become affected that a great deal of effort is required (by someone who really understands the computer program and construction logic) to revise the network to the contract completion date.

An answer to this problem may be to limit the activities to a smaller number (say 300), thereby making them more general in scope and easier to revise when problems arise. Furthermore, the program should be designed to "select-sort" by trade or subcontract (mechanical, electrical, etc.). Then each subcontractor can have one or two printout sheets with only his or her activities on it. The subcontractor gives input to the prime, who manages the total network with the ROICC.

The prime contractor then may see that he or she has a manageable system and may be more persuaded to use this in day-to-day management. Once convinced, the prime and subs will be required to bring their "piece" of the network to progress meetings and work from it.

One of the questions to arise is whether a smaller number of activities gives sufficient data for efficient project management. The answer is yes, and that this would certainly be superior to the bogus NAS information (not used as a management tool) the contractor forwards with the monthly payment request.

How then do we get the information we need to manage the contract (especially at the field level) with a smaller number of activities? One solution is to manage the project from a "big picture" standpoint with the NAS and manage from the field office with the NAS *and* biweekly/monthly bar charts, which provide more specific information about the ongoing or scheduled activities in the immediate future.

An example: The NAS shows mechanical work for a facility as "zone 1 rough plumbing," instead of "rough plumbing room 101," "rough plumbing room 102," etc. The NAS has a scheduled duration for the rough plumbing for each zone of the facility. As the time grows near to begin this activity, the more specific (two to four weeks in advance) bar chart to be used in the field may be reviewed in the regular progress meetings (with the NAS) to see when individual rooms in zone 1 are to be started and completed, as well as to more finely coordinate this activity's schedule with other activities and trades.

Management by NAS of submittals is quite valuable, as success in meeting government construction schedules depends upon the contractor's proficiency in forwarding for approval his or her submittals of shop drawings and material. Additionally, the NAS may be cost-loaded, making the jobs of government and contractor project managers much easier.

It should be noted that NAS (or its equivalent) may not be applicable to contracts below the $200,000 range, but it is certainly of value on the larger jobs. There are a number of personal computer software programs available which make the job of network leveling easier. Examples of these are Microsoft Project, Super-Project Plus, and Microtrak — with varying degrees of user-friendliness. If you, the project manager (government or civilian), wish to use the NAS, it may be time well spent to demonstrate to the contractor how more efficient project management may be realized by the use of the NAS.

A government project manager should review the NFGS (Section 01013) on scheduling during the constructibility review to ensure that the contract specifies the scheduling format desired. Paragraph 2.1.1 of NFGS 01013 requires a fill-in-the-blank entry for the number of NAS activities. For the *solution* discussed in the previous column, this *entry* should be completed and a *paragraph added* requiring additional *bar charts.*

A properly detailed and updated Network Analysis System can be of significant value in project management, determining the interdependencies of activities (tasks) and the impact of any delay to project activities. Let us continue to make them more useful and productive in contract administration, rather than simply a paperwork drill that the contractor must go through to submit a payment notice. □

New portable water well-drilling system here

By JERRY THOMAS
Naval Civil Engineering Laboratory
Port Hueneme, Calif.

The Navy expects its urgent need for a portable water well-drilling system to be resolved with the development of a new rig with a unique telescoping mast and an advanced hydraulic system.

The Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif., is testing and evaluating a lightweight water drill which can be transported by air or in an 8 foot by 8 foot by 20 foot shipping container. It's being developed under a contract awarded to Ingersoll-Rand, a leading manufacturer of drilling equipment.

NCEL considers the novel system, designed specifically for advanced base operations, to be the answer to Navy requirements for a mobile, rapid-drilling operation capable of reaching water depths of 1,500 feet within five days. The rig will prove invaluable where surface water supplies are inadequate or contaminated.

A conventional drilling rig uses a mast or derrick, 25 to 30 feet high, to accommodate standard 20-foot sections of drill pipe. However, such one-piece derricks are difficult to transport. They can't be shipped in containers and require disassembly before being transported by plane. In addition, when folded over the cab of a truck, the excessive length and height of the mast make steering and driving difficult.

NCEL Project Engineer Clark Hoffman said present Navy well-drilling rigs are incapable of drilling a 12-inch hole to 1,200 feet, or a 6-inch hole to 1,500 feet. These rigs aren't self-propelled, lack the mobility to be relocated to other drilling sites, and require at least 12 trained men for an around-the-clock drilling operation. Hoffman said the new drilling rig will eliminate these limitations.

The new design incorporates a mast/hoist assembly that uses telescopic steel cylinders. The innovative concept limits overall rig size to 20 feet in length, less than 8 feet in height, and less than 25,000 pounds in weight. The drilling mechanism (top head drive) will develop a maximum torque of 60,000 inch-pounds, and is guided on the outside of the mast by hydraulic cylinders which can raise and lower 1,500 feet of drill stem and drill bit.

The new system must meet stringent military requirements before it is accepted by the Navy. The rig must be rugged and capable of drilling rapidly through various subsurface conditions using mud, air, and down-the-hole hammer drilling techniques. Because it's shipped as a completely assembled rig, it can begin drilling less than an hour after arrival at a selected site.

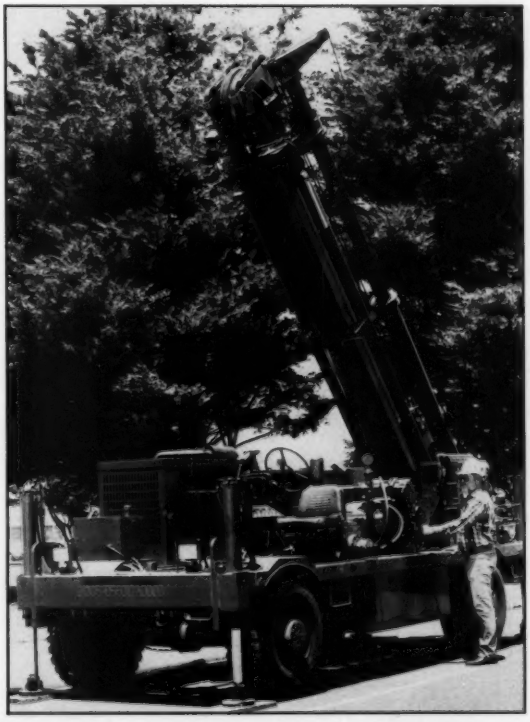
Hoffman said the system must prove reliable in field operations for at least 90 days. It must function 22 hours a day. The remaining two hours are dedicated to preventative maintenance and minor repairs. A two-man crew can drill on slopes as steep as eight degrees, using four hydraulic stabilizing and leveling jacks.

The all-hydraulic system provides power for each operation. Hoffman compares the smoothness of the simple system to an automatic transmission that replaces a stick shift in a car.

The four-wheel rig will be self-propelled and capable of off-road speeds up to 10 miles an hour.

The Laboratory tested the new system in Texas and Tennessee this summer, successfully drilling holes to depths of 1,500 feet. Final testing and evaluation are scheduled this year at Fort Hunter Liggett, Calif., and the Naval Construction Battalion Center, Port Hueneme.

During July, NCEL sponsored a 10-day advanced training seminar for a select group of qualified well drillers and instructors. Ingersoll-Rand provided six instructors whose agenda included site selection and geology, rig operation and maintenance, and systems inspection. Approximately 20 civilian and military students participated in the drilling of a salt water well to 60 feet on Laboratory property, and in an air drilling exercise at Laguna Peak, near Point Mugu, Calif. □



Prototype of a new Navy water well-drilling rig features a unique telescoping mast and an advanced hydraulics system. Mike Thomas, equipment specialist, observes the rig's mast being raised.

Samoans welcome first Seabees since WW II

By LTJG JACK FRASER
CEC, USN
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AROICC
PWC San Diego, Calif.

During World War II and our nation's military advancement through the Pacific, the Seabees built a support airfield on the island of Western Samoa. Since that time, no U.S. forces have disembarked equipment to accomplish heavy construction projects — a fact that is engrained in the memory of many elder chiefs of Western Samoa. The U.S. government, armed with the knowledge that assistance is short-lived if rendered in dollars rather that physical, concrete, longstanding effort, did not send money. Instead, U.S. leaders ordered the best possible alternative be sent — the Seabees!

In June 1986, the Seabees of Naval Construction Battalion Forty (NMCB-40) were tasked to accomplish a unique mission: travel to Western Samoa via the U.S.S. Schenectedy LST 1185, bring all tools, equipment, and men in order to exercise their skills in air and sea embarkation; perform specially selected construction projects needed by local communities and distribute more than 24 pallets of Project Handclasp materials; finally, and probably most importantly, create a favorable image of the United States in the South Pacific.

In July, a 14-man team was carefully screened and selected. Immediately upon the August return from NMCB-40's Okinawa, Japan, deployment, the team's planning and staging efforts were underway in Port Hueneme, Calif. In less than three weeks, the civic action detachment was aboard ship and departing from San Diego Naval Station for Western Samoa.

CECS Wilmot and UTC V. Peterson show two local Samoans the technique of placing concrete.

Twenty-one days later, with a seven-day stop in Hawaii for Marine amphibious exercises and participation in an "over the line" equator-crossing ceremony in transit, the U.S.S. Schenectady on September 15 moored pierside in Apia Harbor, Western Samoa.

Western Samoa lies approximately 2,600 miles southwest of Hawaii and 2,700 miles east of Sydney, Australia. Apia, the seat of government and center of commerce, houses about 25 percent of Western Samoa's 162,000 residents. The population is 90 percent full Samoan, making this the largest full-blooded Polynesian population in the world today.

The offload proceeded at full speed. Local crane support was necessary due to difficulties the ship anticipated with dropping the bow ramp. Because of crane radius and pier location constraints, four of six pieces of construction equipment had to be broken down (two dump-trucks, front-end loader, and grader.) Working through the night, offload was completed in 14 hours. Immediately, the equipment was reassembled, tools and material were staged, and work proceeded as planned.

The construction tasking was carefully selected for community impact and long-term value. Using United States Agency for International Development (U.S.A.I.D.) money for local material purchases, and a one-month construction schedule, four main projects were the focus of the deployment:

1. The Marist School House had a deteriorated structure, with an unlevel foundation, homemade doors, rotted timber louver windows without solid framing, inadequate lighting, and a dilapidated ceiling. The team demolished and replaced the unlevel foundation section,

CM2 Larry Price and CM2 Lehman dismantle a dumptruck to lighten the load for the crane.

installed new windows and doors with frames, reworked ceiling and lighting systems, and had time to fabricate chalkboards, paint, and resurface 30 classroom desks.

2. At the Leififi School, the main open-air auditorium, snack bar, and storage area were inadequate. The auditorium's deteriorated 20 foot by 40 foot tongue-and-groove, wood decking was removed to allow for new concrete pier placement and new decking was installed and finished.

The existing ceiling was also tongue-and-groove construction; the team went beyond original tasking by completely stripping and sanding the badly weathered ceiling, installing new lighting, and applying new varnish.

The existing snack bar and storage additions were demolished, concrete foundations were cast, and the new additions were framed and sided.

3. Adjacent to the Leififi School, a 20 foot by 48 foot pre-engineered building was erected to serve as a general sciences building, and to allow for a substantial increase in enrollment. Total construction time from slab to roof was only five days.

4. Lastly, road repair work was accomplished to grade and improve drainage on secondary roads in the outer villages.

SW2 Scartozzi and EO2 Brandt steady a Seabee dumptruck with tag lines.

A highlight of the deployment was the warm reception and appreciation exhibited by the local people. Coordinating with the U.S. Embassy representative, the team worked through the local Lions Club to distribute over $36,000 of Handclasp textbooks, toys, medical supplies, and a sewing package complete with a new industrial Singer sewing machine. Reciprocating the giving spirit, the Samoan high chiefs performed a coveted "Kava" ceremony for RAdm. A. W. Fort during his visit to the island.

The deployment concluded 34 days later with a C-5 air embarkation of all team equipment and supplies. All

CM2 Price and CM2 Lehman dismantled all equipment exceeding the local cranes' capacity.

Samoans attach significance to Seabee deeds

gear was pre-staged and inspected by an Air Force A.L.C.E. team; the onload took three hours. With approximately 2,000 Western Samoan onlookers at the airport, the team left Western Samoa on October 19, 1986.

NMCB-40's civic action detachment was a resounding success with the people of Western Samoa. What 14 men can do in one month is by definition small, but the Western Samoans attach a great deal of significance to these accomplishments, offering one of the few tangible results since World War II. The Western Samoans deserve great respect — they are a very tightly bonded culture with a great deal of pride in their independence.

A select group of Seabees superbly demonstrated that same great concept of dedication and teamwork. Most importantly, they projected extreme pride, professionalism, and competence, leaving behind an outstanding reputation for others to build upon.

Surely, there can be no better way for a junior naval officer to serve his or her country while deriving self-satisfaction and developing extreme pride in being associated with the U.S. Navy Seabees.

BU2 R. Springer, EO2 Brandt, BU2 Cummings, BU2 Shaw, and OIC Lt. j.g. Jack Fraser in an "all-hands" operation.

EO2 Brandt loads fill for EO1 Schmidt's dumptruck. Secondary beach roads were regraded for proper drainage.

A tabular format approach to

Service contract writing

By DANIEL L. EVEREST, JR.
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If necessity is the mother of invention, then necessity has once again given birth — in this case, to a new contracting tool. Engineers at the Pacific Division (PACDIV), Naval Facilities Engineering Command (NAVFAC), Pearl Harbor, were faced with the monumental task of updating and revising a complex performance work statement (PWS) covering 25 diverse functions, from food services to port and harbor services. In response to the challenge, the specifications writing team formulated an innovative contract format which presented the contractual requirements in logically arranged tables. The result was a PWS that was complete, comprehensive, readable, and orderly so that contractors, customers, and contract administrators can easily locate and understand the contractual requirements.

The new contract format was developed for base operating support (BOS) services on Diego Garcia, a remote but strategic island in the middle of the Indian Ocean. The BOS contract is the largest in the Navy, with approximately 1,600 contractor personnel. The initial contract was awarded in 1983 using a cost-reimbursable form of contract with a fixed target and cost-sharing for underruns and overruns.

This form of contract was necessary during this period of tremendous growth in terms of the number of facilities and types of services necessary to meet the government's changing and expanding needs. Since the contract will expire in September 1988, efforts to resolicit the contract were initiated early to ensure adequate time to plot necessary changes and to measure their impact. The change in the PWS format from narrative to tabular has already improved understanding of the contract requirements between the customer and the contracting office tremendously.

The resolicitation of the contract could not proceed under the existing form of contract for the following reasons:

- **Contract Type.** The current BOS PWS was written specifically for a cost-reimbursable form of contract using broad and often vaguely described work statements. Much of this was done purposely to allow maximum flexibility in contract interpretation of the scope of work in order to allow the contractor to respond to emergent and evolving requirements which the government could not define with clarity. Lack of work definition was predominant for the initial solicitation because Diego Garcia was still being built (i.e., $500 million military construction over five years) and historical perspective was absent. Under a cost-reimbursable form of contract, a loosely defined PWS works well; however, PACDIV was directed by NAVFAC to convert to a fixed price with award-fee contract during the resolicitation, and thus the entire PWS needed to be revised and defined to a much greater level of detail.
- **Information for Bidders.** After several years of operation, enough historical data is available for prospective contractors to adequately prepare their bids. The trouble is, how do we best display this information to them?
- **Quality Assurance (QA) Plans.** Shifting to a stricter contract type and adding schedules of deductions places an even greater responsibility on the shoulders of the Diego Garcia quality assurance evaluators (QAEs). Therefore, better, more detailed QA plans must be developed for them to follow.
- **Award Fee.** Because the contractor can earn additional periodic compensation based on quality, cooperativeness, responsiveness, and other performance criteria, he or she needs to know the minimum levels of performance to avoid unsatisfactory ratings and maintain eligibility for award.

So how does the government respond to major changes of this nature? This is a large contract, one with 25 functional annexes encompassing harbor operations, air operations, and everything imaginable in between!

The Diego Garcia specification writing team developed an imaginative solution to their contract evaluation which not only takes care of Diego Garcia but also may have far-reaching impact on other contracts as well. We call it tabular formatting.

Here's how it works.

- Every annex in the BOS contract covers a different functional area, i.e., utilities, stevedoring, billeting, etc. Therefore, treat each annex as a separate PWS.
- Standardize the format for each annex (PWS) — rigidly! Let the flexibility come in the requirements, not the format. What is the best format? A good start is to place requirements into one of three categories:
  1. Informational/general
  2. Yes/no evaluation
  3. Evaluation based on measurement

Note the word "evaluation" in the second and third

categories. Whose "evaluation"? The QAE's. Writing a PWS in tabular format makes the specification writer think like a QAE and the prospective bidder think in terms of being evaluated. Not a bad idea!

But what do these categories mean? First, some requirements are so general they are more informational than true requirements. An example is "perform custodial services for Diego Garcia." (Try making a deduction stick on that one!) However, these "requirements" are necessary to the introduction of an annex or PWS (provided there aren't too many of them).

Next are the yes/no requirements — those the contractor either has or has not met. Personnel qualifications fit well into this category. The employee either has the required certification of competency, or . . . well, you get the picture.

Finally are the requirements needing some type of measurement (or in the worst case, judgment) to determine satisfactory completion. The majority of contract technical requirements fall into this category.

How do we treat these categories?

• Develop a format best suited to each category type. Obviously, general or "yes/no"-type requirements can be described using short, simple statements. They are found in each annex of the Diego Garcia (DG) BOS in standard PWS paragraph format. Following is an outline of the "standard" requirement types:

OUTLINE OF PARAGRAPHS A AND B DIEGO GARCIA BOS CONTRACT PWS

Paragraph No.	Description
A.	General Requirements
A.1	Scope of Work
A.2	Definitions
A.3	References
A.4	Safety Provisions
A.5	Description of Existing Conditions
A.6	Hours of Operation
B.	Personnel Qualifications

This takes care of the general and yes/no-type requirements. But what about contract requirements needing measurement, inspection, and judgment to determine if they have been successfully completed? Using the standard PWS paragraph format, these may get the message across to the contractor in a legally defensible manner, but formulating QA plans, building schedules of deductions, or figuring out what is expected of the contractor can be difficult in this format.

With this in mind, the DG BOS specification writing team set out to establish a format that would meet the

ITEM NO.	MAJOR CONTRACT REQUIREMENT	RELATED REQUIREMENT OR INFORMATION	ESTIMATED QUANTITY	PERFORMANCE STANDARD
16.C.2.c(2)	Perform all required maintenance and repair of the airfield arresting gear and appurtenances.	Instructions are outlined in NAVAIR 51-5-31, Section VII, PMS letter of Promulgation (AIR 5372IC.54:HAT) of Sep 1971 and Maintenance & Material Management (3-M) Manual OPNAVINST 4352.	One E-28 arresting gear.	Same as for 16.C.2.c(1).
16.C.3	HARBOR OPERATIONS			
16.C.3.a	Pier Standby. Provide pier standby, as required by the Government.	Nothing additional.	14 requests per year.	100% of pier standby requests met.
16.C.3.b	Testing. Test fire hose on tugs and ships as required or requested by the Government.	Nothing additional.	1 request per year	100% compliance with required/ requested tests.
16.C.4	FIRE PREVENTION/PROTECTION INSPECTIONS			
16.C.4.a	Provide full-time fire prevention inspectors to perform fire safety inspections of all structures and outside storage areas in accordance with NAVMATINST 11320.14 and the plan as provided to the Government in paragraph 16.F.3 and outlined as follows:	Prepare applicable reports noted in paragraph 16.F.10.	As approved by ROIC.	At least 95% of inspections completed on time. 100% of discrepancies corrected within 7 working days.
16.C.4.b	Buildings and Grounds. Perform a monthly fire prevention inspection of all buildings and grounds in accordance with NAVMATINST 11320.14.	Inspection will include all of Diego Garcia and will include all conditions and practices related to fire safety.	1,234 buildings. 1.5M sq ft of building space. 7,000 acres of grounds.	100% of buildings and grounds inspected monthly.
16.C.4.c	Industrial Areas. Perform a weekly fire prevention inspection of all industrial areas in accordance with NAVMATINST 11320.14, enclosure (2), para. 2.n.	Inspection frequency shall be commensurate with the hazard. Alleviate all fire and explosive hazards discovered during inspection.	See map of Industrial Areas.	100% of fire and explosive hazards identified and alleviated.
16.C.4.d	Recreational Facilities. Perform fire prevention inspection of recreational facilities at closing time in accordance with NAVMATINST 11320.14, enclosure (2), page 4, paragraph 2.1 and OPNAV NOTICE 11320.	Alleviate all fire hazards discovered during inspection.	9 recreational facilities.	100% of inspections conducted and hazards alleviated.
16.C.4.e	Area Fire Marshall Inspection. Correct all discrepancies resulting from the Area Fire Marshall Inspection and provide to the Government a written plan describing what actions will be taken to prevent the discrepancies from reoccurring.	Inspection conducted in accordance with DODINST 6055.6, NAVMATINST 11320.15, NAVAIR 00-80R-14 (NATOPS) and NAVMATINST 11320.12 series. Inspection covers overall operations including emergency drills and an inspection of records, reports, facilities and the technical library.	Approximately 1 inspection per 18 months.	100% of correction made within 30 days of inspection. Written discrepancy correction plan submitted within 30 days of inspection. 0 instances of corrected discrepancies reoccurring.

TABULAR FORMAT — Sample Page from Diego Garcia BOS Draft PWS (Subject to Review)

Excerpt from PWS

following criteria:

- Reads easy to government and contractor personnel alike
- Provides a foundation for QA plans and the schedule of deductions
- Allows inclusion of historical data in each requirement to assist contractors in preparing their bids
- Provides the necessary standards for government and contractor to determine level of performance

The team concluded that only requirements written in tabular format would meet this criteria. The idea came from NAVFAC MO-327, *Service Contracts: Specifications and Surveillance Manual,* where a tabular format was used to develop the performance requirements summaries. Once writing the requirements in table form were agreed to, developing the actual format to be used for the Diego Garcia PWS was relatively simple. On the previous page is an excerpt from the actual PWS.

As can be seen, this is quite different from the standard PWS! Essentially, all requirements in this format have become independent contract line items, each consisting of five key components. A brief description follows:

1. **Item number.** Self-explanatory.

2. **Major contract requirement.** A short and simple subject/verb/object statement which describes basic contractor responsibility. In the standard PWS format, the major contract requirement most likely would have appeared as the first sentence in a paragraph describing and explaining a series of related requirements. It often began with, "The Contractor shall . . .," a phrase the specification team felt was cumbersome, unnecessary, and worthy of elimination whenever possible.

3. **Related requirement or information.** Almost every major contract requirement has a need for supporting information which further describes and explains the requirement. It often contains related requirements (example: if the major requirement is to provide a water sample, a related requirement may be the address to send it to or a description of the conditions under which it should be taken).

4. **Estimated quantity.** Historical data or scope estimates go here, as do work performance frequencies and number of items to be serviced. This information helps bidders determine the resources needed to perform the requirement. Obviously this information also will be useful in determining QAE staffing levels.

5. **Performance standard.** Minimum acceptable level(s) of performance for the requirement go here. Why give this information to the contractor? Will the level of performance drop once the acceptable levels are known? For the DG BOS contract, the answer is no. The contractor is still responsible for 100 percent performance, and rework will be required in cases where 100 percent is not met. Also, deductions will be made for work not performed or work performed in an unsatisfactory manner and not corrected. With this contract, however, it is also the government's intent to let the contractor know whether or not his or her work is satisfactory. The information will be particularly useful in determining the contractor's award fee on a quarterly basis, and will also be useful in forming QA plans.

Once you know how to break requirements into their component parts, the only thing left is putting them in logical order. The following is the outline of the "tabular format" requirements used for one annex of the DG BOS contract:

SAMPLE OUTLINE OF
TABULAR FORMAT REQUIREMENTS
DIEGO GARCIA BOS CONTRACT

ANNEX 16
CRASH AND FIRE PROTECTION SERVICES

Paragraph Description

C. Performance Requirements
C.1 Executing Planned Requirements
C.2 Air Operations
C.3 Harbor Operations
C.4 Fire Prevention/Protection Inspections
C.5 Fire Protection Systems and Equipment
C.6 Fire Alarm Systems
C.7 Burning, Cutting, and Welding Operations
C.8 Facilities, New Construction and Alteration
C.9 Training
C.10 Fire Hydrants
C.11 Crash/Fire/Rescue Vehicles
C.12 Fire Extinguishers
C.13 Fire Investigations
C.14 Communications
C.15 Fire Drills
C.16 Warning Signs
C.17 Attire
C.18 Housekeeping
C.19 Reference Library
D. Watch-standing Requirements
D.1 Crash/Fire/Rescue Apparatus Manning
D.2 Watch-standing Personnel
E. Time and Materials Requirements (None)
F. Records and Deliverables
F.1 Management Program
F.2 Fire-fighting Operations Pre-plans
F.3 Fire Safety Inspections Plan
F.4 Fire Protection Systems Inspection Plan
F.5 Discrepancy Reports
F.6 Structural Fire Reports
F.7 Fire Message Report
F.8 Recall Plan
F.9 Daily Staffing Report
F.10 Administrative Files
F.11 Other Reports
G. Materials, Equipment, and Facilities
G.1 Government-furnished Material
G.2 Government-furnished Equipment
G.3 Government-furnished Facilities
G.4 Contractor-furnished Materials
G.5 Contractor-furnished Equipment

Tabular formatting — more than a one-shot solution

continued from preceding page

This is the tabular format — a listing of contract "line items" broken into components, each meeting a specific criteria. And because all the requirements are in line-item format, we can now begin preparing QA plans and schedules of deductions based on individual requirements as opposed to working with paragraphs, each containing several "buried" requirements.

This format doesn't look much like a standard PWS. It does meet all of the DG BOS contract criteria, however, as well as the criteria for many other types of contracts. This concept has many advantages over the "old" format even on other applications. The advantages include:

- **Easy to Use.** It's easy to read and easy to modify, especially in a large-scope contract where modifications occur due to constantly evolving government needs. The tabular format allows requirements to be added, changed, or removed without major rewrites, reducing the possibility of interpretation and simplifying the negotiation process.

This format also simplifies and improves specification writing. A contract of this magnitude involves input from many different sources, particularly technical experts with little or no PWS writing experience. The tabular format provides a standardized guideline which requires an organized and logical approach to specification preparation.

- **Spreadsheeting Applications.** All contract requirements are in a spreadsheet format. Paragraphs A and B are in two-column format (item number/requirement), while paragraphs C through G are in the previously described five-column format. Why stop there? Additional columns can be added to cover a variety of information for every contract requirement, from cost estimates to QAE-estimated surveillance times, to dates the requirements were added or last changed. In fact, the DG BOS contract was written using spreadsheet software (Lotus 1-2-3) for just that purpose. Eventually, many of the DG BOS contract administrative duties will be performed using the DG BOS "spreadsheet" which will include the actual PWS as only one of its many parts!
- **Schedules of Deductions.** Individual line items are already identified and the characteristics of the estimated quantities will be helpful in determining schedules of deductions (example: estimated quantity = 14 dumpsters cleaned per week in fiscal year 1986, schedule of deductions quantity = 14 × 52 = 208, unit = "each").
- **QA Plans.** Three of the major QA plan sections already exist — the major contract requirements, the performance standards (Acceptable Quality Levels (AQLs)), and the estimated quantities. Again using the spreadsheet concept, more columns will be added to include the remainder of the MO-327-required QA plan information (primary method of surveillance, level of surveillance, sample size, etc.).
- **Automated Quality Assurance.** Since the spreadsheet we are using can perform computational tasks, travel times and estimated surveillance times will be included in the future and QAE scheduling will be automated. By linking the spreadsheet to evaluation report forms, and inputting completed evaluation data to a database program, future plans are to use the system to automatically:

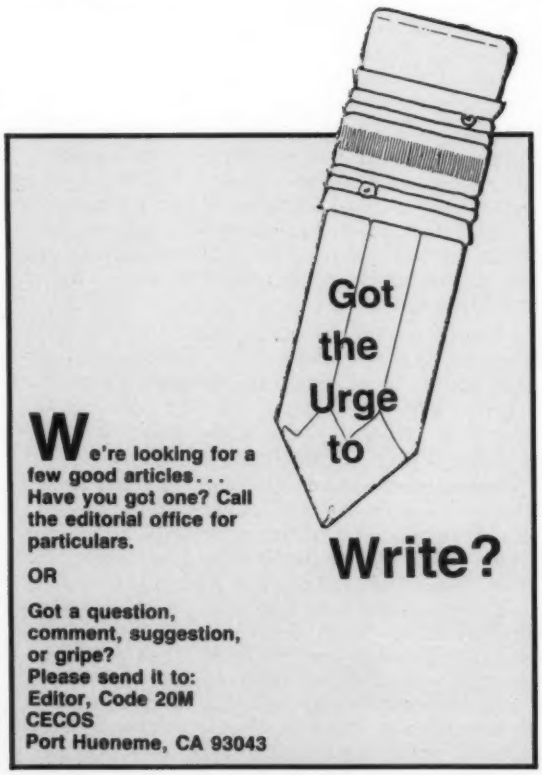
— Schedule the QAE's weekly surveillance. Scheduling will be based on the pre-programmed surveillance frequencies and locations as well as the previous week's accomplished surveillance.

— Generate the surveillance reports needed by the QAE for the week.

— Summarize the contractor's performance based on inputted QAE surveillance, calculate deductions, generate necessary letters to the contractor, etc.

Obviously this is a major undertaking in its own right, and is mentioned here only as one of the many outgrowths of the tabular formatting concept to be developed in the months ahead.

Tabular formatting for contract specification writing is more than a "one-shot" solution to the BOS contract needs of Diego Garcia. Application of this format to all manner of PWS seems both possible and exciting. We at PACDIV are exploring the possibilities now. We hope users throughout the Civil Engineer Corps community also find the concept will help them prepare service contract specifications that are clearer, more concise, and easier to enforce. □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news worth reviewing

First seminar held on waterfront productivity

Twelve select professionals involved in the planning and development of waterfront systems for the Naval Facilities Engineering Command (NAVFAC) have participated in the first computer-aided seminar that focused solely on waterfront productivity enhancement.

Sponsored by NAVFAC, the three-day course was taught recently to representatives from Engineering Field Divisions, Public Work Centers, and NAVFAC Headquarters by NCEL personnel at their Port Hueneme facilities.

Featuring the Graphic Engineering and Mapping System (GEMS), the course concentrated upon state-of-the-art technology for generating computer-aided berthing plans, pier utility optimization, and mooring analysis.

The training depicted NCEL's continuous efforts to transfer technology from a research and development environment to customers in the field.

GEMS waterfront systems training is part of the Port Systems Project, Facilities Systems Division, NCEL.

New enlisted barracks at Great Lakes

Ground was broken at the Naval Training Center, Great Lakes, Ill., for a 720-person barracks building to be used by enlisted students assigned to Navy basic A-type schools.

The four-story, steel-frame structure will be built under a $9,579,425 construction contract awarded by the Naval Facilities Engineering Command's Northern Division. Being constructed under Northern Division supervision are a dozen 60-person bays with four persons to a room.

November 1988 is the projected completion date.

RAdm. Geo. Melville statue moved to new site

A 14-foot, 2½-inch-high monument of RAdm. George V. Melville (1841-1912) moved slowly through the Philadelphia Naval Base main gate and down Broad Street on a flatbed truck.

That 15-ton statue of RAdm Melville (including its marble and concrete base) was moved from the present Franklin D. Roosevelt Park — where it had stood for the previous 45 years — to a spot near the front of Building 6, then the site of the former Fourth Naval District Headquarters.

Now this venerable monument, which had been relegated to a warehouse building in recent years, has been given a good cleaning and resurrected again — to a permanent home.

Climaxing a construction effort supervised by Northern Division, the Naval Ship Systems Engineering Station (NavSSES) has dedicated the new Melville Plaza at Philadelphia Naval Base. The tree-lined plaza is located just south of the Reserve Basin.

Though Admiral Melville gained worldwide fame as an Arctic explorer, he had a distinguished engineering background. NavSSES traces its origins to Melville, who is credited with founding the organization's forerunner — the Fuel Oil Testing Plant — at Philadelphia Navy Yard.

Obstacle course renovated

Midshipmen at the United States Naval Academy will run a new and much safer obstacle course, thanks to Reserve Naval Mobile Construction Battalion 23, based at Fort Belvoir, Va., which rebuilt the course last summer during its two-week annual training.

Time and weather had deteriorated the old course to the point where academy officials decided to suspend use of the obstacle course as part of last year's physical education testing requirements.

"The reservists did a fantastic job," said Naval Academy Public Works Officer Capt. James Weston. "Our own people were unable to replace the course in time for the incoming class to use it this summer because we had just too many other commitments. These reservists came in on short notice and built a first-rate facility," he added.

Reconstruction of the course took 12 days.

"Their cooperation in this project is a good example of how the total Navy works together."

Braving sweltering summer heat and traditional Annapolis humidity, RNMCB-23 began the $17,000 construction project by dismantling the entire course. Reconstruction took 12 days.

The reservists actually did more than just rebuild the same obstacles they had torn down. They also made minor design alterations to make them safer for training. Several midshipment had been injured during the spring of 1986 while jumping from obstacles during timed runs on the course, according to Weston.

To make the course safer, the reservists lowered one of the obstacles from which midshipmen jump by 18 inches for men and 24 inches for women. Also, they softened landing areas with a deeper sand base and a deeper gravel overlay, bordering them to reduce the likelihood of gravel being shifted outside the landing areas.

speaking from topside

Needed to meet today's demands — specialists or generalists?

RAdm. A. Fort

I expect every Civil Engineer Corps officer has considered "Shall I specialize or generalize?". I know I did, many times, as my career was taking shape. Each of us doubtless has an opinion, just as each of us has been "turned on" by one type of assignment over others.

It has always been my strong belief that the Navy is better served and the Civil Engineer Corps and its individual officers are more useful if we remain a well-rounded, multi-talented corps of professional naval officers, knowledgeable and experienced in the broadest spectrum of civil engineer functions—Seabees, public works, construction, contracting, and major staff.

While I feel it is an absolute must for professional *naval officers* to command and lead our entire facilities engineering system, I believe just as strongly that we lose our strength if we isolate individual elements of specialists. Is it not important for a public works officer to know contracting? Ask most PWOs how most of their production is accomplished these days.

Does a tour in the Seabees sensitize a young officer to human values and to leadership skills which are invaluable throughout a career? Where better for a CEC officer to learn how to lead people than as a company commander or as OIC of a CBU? I submit that Seabee duty is a must for a well-rounded career. After all, it is our only direct taste of operating with the fleet and of leading enlisted people.

"ROICC duty" always has appealed as an excellent opportunity for working hands-on with the construction industry. This is still the case, I believe, and an officer's ability to deal successfully in this field, with the multitudes of rules changes and with today's changing technology is a must in a CEC officer's development.

Should a staff officer on the OPNAV, fleet, or TYCOM staffs not be well-schooled in all facets of our business? I know firsthand that better recommendations go forward if the staff civil engineer has firsthand background and knows what he/she is talking about. Let's don't send *experts* without experience!

Analysis of CEC Responsibilities/Qualifications

Public works has changed in the last decade. Circular A-76 now requires contracting to satisfy public works functions where contracting can satisfy requirements more economically. Facility support contracts have become a major way of accomplishing the public works functions. Contracting is pervasive throughout public works today, as all PWOs award and/or administer various kinds of contracts: A-E, facility support, construction, alteration/repair and maintenance, utilities, and real estate.

Commanders of EFDs are responsible for a multiplicity of disciplines: planning, design, construction, alteration, repair, maintenance, utilities, real estate, transportation, housing, budgeting, and management in general. In order to be effective they must possess public works, contract, and, in many instances, Seabee experience. EFD commanders serve as fleet civil engineers. Fleet CINCs and base commanding officers look for and deserve "one-stop service" rather than having to go to different NAVFAC organizations in order to receive support in different disciplines. In order to *effectively command* a multidiscipline organization, the EFD commander or commanding officer should be *experienced* in all disciplines.

Facilities engineering must be conducted on a life-cycle management basis. Since public works experience is needed to incorporate constructability, maintainability, and operability into design and construction, CEC officers in charge of design and construction contract administration must have qualifying experience in public works management.

All CEC flag billets require a background in all civil engineer functions, therefore, in order to be fully qualified, and to be able to perform most effectively, the officer selected for promotion should be experienced in each type of CEC duty. In order for CEC captains to properly perform in their billets requiring decisions in leadership in all NAVFAC functional areas, they must have been allowed to gain the experience through tours of duty in various func-

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The role of architects/engineers in construction contracts

By CDR ROBERT E. YBANEZ
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P.E., Texas
Executive Officer, CECOS
Port Hueneme, Calif.

It might seem that contracts relating to construction do not differ from contracts in general. After taking a more comprehensive look, however, the existing situation in the construction industry is decidedly unusual, even though these contracts have the same legal principles to follow. Consequently, it is of utmost importance that individuals involved with both the design and construction of each project be familiar with contract laws and their implications.

Construction contracts differ from ordinary contracts such as supplies and/or services in that there is no standard product involved, but rather the product is to be constructed in place according to a unique set of requirements and plans. Each structure is different from the next. Because of the considerable degree of complexity involved, the preparation of a construction contract is in itself a specialized form of contracting.

Due to these special technical requirements, the responsibility of preparing the contract documents and their interpretation in the field is usually that of the architect/engineer. These professionals cannot expect attorneys and contract administrators to know the "in's and out's" of what is required and how a construction project is to be accomplished; therefore, they in turn shouldn't expect the attorney to prepare and mitigate these contracts.

This does not mean that the attorney or contract specialist is not essential — they can help in determining type of contract best suited for the purpose, tighten up ambiguous language, and can look for legal defects which might invalidate the contract. As stated by B. C. Gerwick, Jr., an instructor at the University of California at Berkeley, California, "Engineers do not need to know enough law to be without lawyers, but they need to know enough about law to avoid legal problems before they have a chance to arise and to work effectively with lawyers after legal problems arise."

Since the responsibility of preparing and interpreting the initial contract documents is placed on the architect/engineer, the following will endeavor to explain some of the criticism made on the management of Navy construction contracts.

Set-up of the Contract

The construction contract ordinarily consists of up to six parts: the bid documents, the contract form or agreement, general provisions, special provisions, plans or drawings, and additions which supplement, modify, or amend any of the foregoing parts.

These documents, if properly prepared, contain all necessary information from which the contractor can use in making an offer or bid. Now the contractor has the responsibility of interpreting these contract documents with little or no misinterpretation. The offer or bid must be in accordance with these documents in order to accurately estimate the requirements as they are intended and make an offer to ensure a profit.

For example, the legal terminology the Navy uses to describe some items, such as magnitude of the project, time allowed for completion, and the relationship of the government with the contractor, are often misunderstood and place the contractor in a vulnerable situation. Knowledge of law in both these areas — the writing and the preparation of the bid — should be evident. Those in the government cannot do much about the latter.

In many situations, however, not as much attention is paid to the qualifications and/or training received by the designers and field representatives in the aspects of construction law as there is on the contract administrators — this attitude should be changed. The designer should be intimately aware of the different requirements of the law and ensure that the contract is written in such a manner that litigation would be avoided due to errors or omission in requirements.

Administering a Contract

After construction has started, the first duty of the project manager responsible for managing the construction contract for the government is to understand the terminology/requirements of the contract and supervise the works to be sure that he/she makes certain that it is being performed in conformity with the contract and with the plans and specifications. This, however, is not always sufficient in construction contracts — changes to the contract occur every day and amendments to the contracts must be negotiated.

The project manager then decides whether these new changes should be handled as an informal or a formal change order, or by a separate contract. This is an elementary problem which should have an obvious distinction, but one that is nonetheless important in completing the project as required for the benefit of both the government and contractor.

All government contracts contain a clause stating that specific documents be used to change the original contract. From the contractor's and owner's point of view, it is important to observe this clause and that all parties adhere strictly to its requirements.

(Continued on page 25)

VEHICLE BARRIERS:
A new tool to combat terrorism

By MICHAEL SMITH
Security Engineering Division
Naval Civil Engineering Laboratory
Port Hueneme, Calif.

In 1981, a truck with timer-detonated explosives severely damaged a U.S. military headquarters in West Germany. Late in 1983, the terrorist vehicle bomb threat was brought to the attention of the American public even more dramatically when an attack on the Marine barracks in Beirut, Lebanon, killed 241 American servicemen.

Although the Marine barracks were heavily guarded, this incident demonstrated the vulnerability of military installations to vehicle bombs. Incidents like these have made vulnerability to vehicle bombs an important item in the Department of Defense (DoD).

Perimeter security, the first line of defense against physical threats, usually includes fences, gates, walls, and vehicle barriers. However, in the past few years, the need to improve perimeter security has prompted the installation of additional types of vehicle barriers.

From 1981 to 1985, terrorists achieved a 100 percent success rate using vehicles to transport bombs. Of these attacks, 81 percent involved suicide drivers who sacrificed their lives in the assaults. This element of fanaticism is one reason for the high success rate. Cars were used to deliver bombs in 65 percent of the attacks; trucks were used the other 35 percent of the time. Forty-eight percent of the incidents involved head-on crash assaults, 6 percent used evasion by maneuvering around barriers, and 42 percent (and rising rapidly) used deception to gain entry under false pretenses.

There was little guidance initially to thwart the threat of vehicle bombs. Today, vehicle barriers are becoming a common sight around government buildings. Many DoD activities are installing their own vehicle barriers, and a commercial industry in vehicle barriers is growing rapidly (over 30 companies are now marketing barriers).

Typically, vehicle barriers are mechanical devices that operate manually or automatically (to "open" and "close") and deny penetration of a vehicle of a given weight and speed. Most commercial products are the "active" type (Figure 1).

In 1984, a study by the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif., showed that many of the steps being taken to counter the terrorist threat were inadequate. For example, many activities reported that they were constructing conventional chain-link fences as vehicle barriers.

Sandia National Laboratory's *Barrier Technology Handbook*, 1977, had reported, however, that such fencing was ineffective as a vehicle barrier. This absence of attention to an overall solution, and the use of methods and devices without adequate performance data, create a dangerous and possibly false sense of security.

In 1985, the Navy became the DoD's lead service to establish guidelines and identify equipment and techniques to defend against vehicle bombs. NCEL was selected to perform the research required. NCEL is now engaged in a barrier assessment project to produce clear-cut guidance and sound objective standards for vehicle barriers for use by DoD and other federal government activities.

The Laboratory will provide DoD engineers with a systematic approach for countering the terrorist vehicle bomb problem. Included will be guidance on how far from a building to locate the perimeter security to

VEHICLE BARRIER TYPES

ACTIVE	PASSIVE
Chain Link Gate/Wire Rope	Chain Link Fence/Wire Rope
Siiding Beam	Concrete Shapes
Vehicle (Truck, Tank)	Buried Tires
Impalements	Steel Guard Rails
Rotating/Retracting Devices	Walls
Arrestors	Rock-Filled V-Fence
Pit/Ramp	Sand-Filled Oil Drums/ Tires
Tire Shredder	Trees
	Trenches/Berms
	Hedge Hogs
	Pole Fields

Figure 1.
Most commercial barriers are active types.

protect the building and its occupants. The Laboratory is also conducting research on a relatively new subject — building hardening — to develop engineering solutions against the effects of blast on doors, windows, walls, and entire structures.

Military planners need to consider the points listed in Figure 2 when selecting a vehicle barrier, particularly cost versus performance data. To determine performance charactertistics, NCEL is conducting tests of many types of active and passive barriers. NCEL and the Naval Weapons Center (NWC), China Lake, Calif., have developed a test facility at China Lake.

CONSIDERATIONS

Define the threat (weight, speed, and payload)
Location
Operation (normally open/closed operation)
Frequency of use
Aesthetics
Safety
Environmental effects
Compatibility with other security elements
Installation requirements
Design (hard vs. soft stop)
Cost

Figure 2.
Factors to consider when selecting a vehicle barrier.

It is a 100-foot track where a vehicle can be mounted and propelled (using rockets) into a barrier. It is being used to evaluate vehicle barriers for potential use by the Department of State and DoD. Construction of the facility was completed in October 1985, and the first barrier was tested in November 1985. To date, 10 barriers have been tested.

The tests are conducted to either DoD or State Department requirements of 10,000-pound vehicle weight at 15 or 50 miles per hour (mph), or 15,000-pound vehicle weight at 50 mph. Performances are based on actual crash tests and should eliminate the problem of improper vehicle barrier selection.

Photographs show the vehicle, the barrier, and the result of one crash test. This was a 10,000-pound truck propelled into a pit-ramp-type barrier at 50 mph. The truck was stopped and destroyed. Another photograph shows another test of a different type of barrier (sliding gate). In this test, the vehicle weighed 15,000 pounds and was accelerated to 50 mph into the barrier. Again, the vehicle was destroyed. Results of the NCEL tests will be made available to appropriate military and federal agencies.

During the past four years, it has become apparent that elimination of the terrorist vehicle bomb threat is not possible. It is possible, however, to minimize the threat with better perimeter security. The Navy has taken a major step toward increasing that security with guidelines that can effectively improve perimeter security and provide a viable defense against vehicle bombs. □

A 10,000-pound rocket-propelled truck is prepared for a test run.

The same truck after crashing into the barrier at 50 mph.

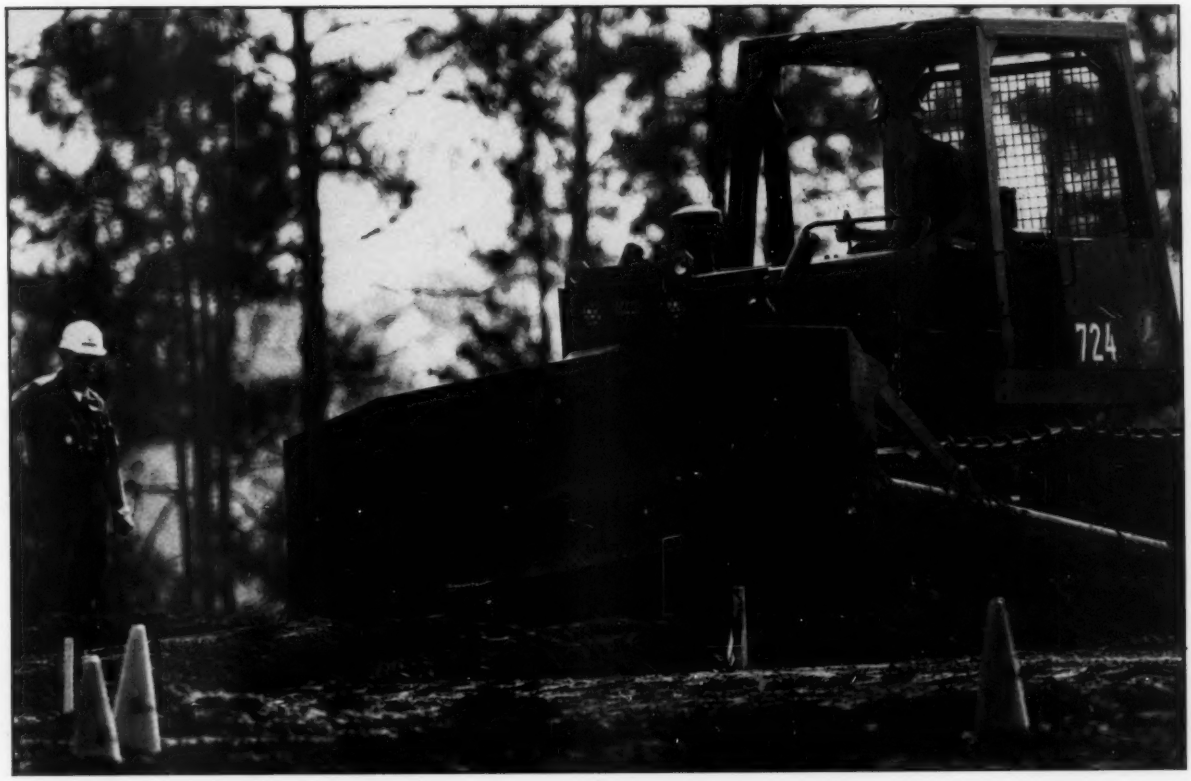
A 15,000-pound truck after crashing into a sliding gate barrier at 50 mph.

Seabees use rodeo concept as training tool

By JOCS DONNA LYNN WIELINSKI
USNR-R

EOCN Mark Grey watches intently as a competitor completes the bulldozer maneuvering event at the first Reserve Seabee Equipment rodeo.

Below: EO3 Dennis Barry maneuvers his bulldozer carefully under the watchful eyes of evaluator EQCM Carroll Nelson as he works to smooth the earth after filling in a trench.



There were no steers to be roped, or broncs to be broken in the rodeo held in Gulfport. Instead, sixteen young Seabees from all over the United States pitted their skills in handling heavy equipment against each other in the first-ever Navy Equipment ROADeo.

Equipment rodeos have been around the construction and heavy equipment industry for many years. While the idea of equipment rodeos is not new, the Reserve Naval Construction Force (RNCF) used the familiar concept as an innovative tool to evaluate one aspect of their training program.

"There are more than 3,000 young nonrated Reserve Seabee equipment operators, and although they've been through equipment operator school, training is an ongoing concern," commented RAdm. Charles R. Smith, Commander, RNCF.

The RNCF rodeo competition, named "Lone Rider '87," consisted of a number of events, each designed not only to test a level of knowledge and skill, but also training. Fifteen evaluators from the 8th and 20th Reserve Naval Mobile Construction Battalions (RNMCBs); 1st, 8th, 9th, and 20th Reserve Naval Construction Regiments (RNCRs); and Commander, RNCF, were responsible for overseeing the competition events.

"The point of the equipment rodeo was to see how efficiently, effectively, and safely these young people perform," remarked Cdr. Richard Miller, RNCF staff, whose idea prompted the equipment rodeo. "And we wanted to do it in an environment which would promote professional pride and camaraderie," he added.

"The level of training they showed in the competition tells us they can get projects done, and that's what's important," commented EOC H. Eli Wesley, evaluator for the dumptruck portion of the competition.

"Lone Rider '87" events included a personal

Each event tested ability as well as knowledge

interview section where competitors were evaluated on their appearance, attitude, safety awareness, and personal objectives relative to the Reserve program. Competitors then had to complete pre-start checks on four different pieces of equipment under the watchful eyes of evaluators.

During the equipment exercise portion of the competition, the contestants' skill in guiding five-ton military dumptrucks, front-end and track loaders, rubber-tire loaders, and bulldozers through a number of different maneuvers was tested. Although all but one of the events had to be completed within a specified timeframe, time was only one critical element competitors had to contend with. The smoothness of their maneuvers, their ability to coordinate their movements with that of the machine resulting in smoothness of operation and control accuracy was considered equally important.

Each of the events in the day-long competition tested different abilities of the contestants as well as their knowledge.

"We looked for the right level of skill — most of these young men aren't equipment operators on the outside," commented CMCS Carl K. Praski, COMRNCF staff evaluator. "In one sense, the competition was a measuring stick for our training program." He added, "It told us what we wanted to know — that our program is encouraging the development of elementary skills."

"We also want our equipment operators to be able to handle a variety of equipment. The civilian operator may shine in one area, and maybe have a slight edge on one piece of equipment," commented Chief Wesley.

Chief Wesley was right. "Lone Rider '87" overall winner was Equipment Operator David L. Graham of Oak Grove, Mo. Graham, a member of Detachment 0215, RNMCB-15 in Kansas City, Mo., works for the city of Oak Grove parks and garden department where the largest piece of equipment he drives is a pick-up truck.

In fact, most of the competitors in the primary and alternate categories had no training or experience on heavy equipment prior to joining the Seabees.

"With our training program we try to develop good apprentices; expertise only comes with experience," said Chief Wesley.

"Even then, equipment operators are never really satisfied with their performance, they always want to do better," agreed EO2 Mike Teague, an evaluator from RNMCB-18.

Competition was keen, the competitive spirit high, and according to evaluators, final scores were even closer than expected.

"You expect competitions of this sort to be close, especially since all the contestants are winners of local competitions," remarked Chief Wesley, "but there was an even narrower range than usual

EOCN Vaughn Plium laughs after finishing maneuvering his Case 1150 bulldozer over the course.

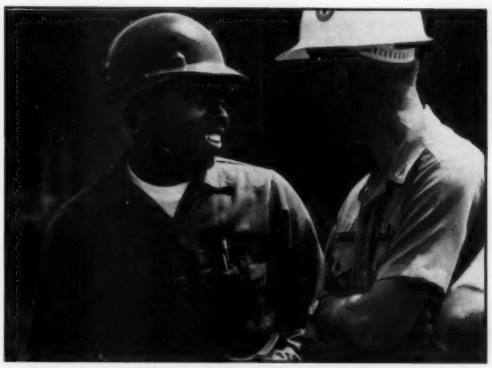
between competitors."

Other winners were: Mark Gray, 9th RNCR, first runner-up; Vaughn Pluim, 1st RNCR, second runner-up; George Simpson, 5th RNCR, third runner-up; Reid Septor, 8th RNCR, alternate category winner; and Rusty McKellar, 9th RNCR, alternate category runner-up. Each winner took home a personal plaque and mug along with a trophy for his regiment to hold until next year's competition. The trophies were all donated by the Construction Industry Manufacturers Association, Milwaukee, Wis., which manufactured much of the equipment used in the equipment rodeo.

EOCN Donald Rex listens carefully as evaluator EO2 Mike Teague explains what he will have to do during one of the events.

We try to develop good apprentices — expertise only comes with experience

The Reserve Forces make up 9 of 11 Seabee Regiments and 17 of the 26 Seabee Battalions, and by 1990, 6,000 Reserve Seabees will not have had active duty experience. This fact underlines the importance of providing a viable training program which emphasizes not only training, but also the development of valuable experience. Competitions such as "Lone Rider '87" can provide one means to evaluate the effectiveness of Navy Reserve Seabee equipment operator training. □



EOCA James Denny talks with RAdm. Charles R. Smith, Commander, Reserve Naval Construction Force, between events.

Proud competitors in the first-ever Navy equipment "roadeo" join with RAdm. C. R. Smith to celebrate after the day-long competition.

One approach to writing criteria

By DAVID CARPENTER
Head, Coal/Air Department
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The Naval Facilities Engineering Command (NAVFAC) produces hundreds of documents each year that describe designs, provide instructions to designers, and present sample design and construction specifications. These documents collectively are called "engineering and design criteria." They cover the "simplest" construction operation — e.g., laying resilient flooring, to the most complex — e.g., constructing a central power plant.

Architect/engineer firms, engineering field division (EFDs), and public works departments use criteria to design and specify construction projects. Just as a building rests on its foundation, a project's success or failure depends on adequate criteria to ensure proper design and construction.

The "Classic Approach"

The task of writing criteria is complex in that the language must conform to legal standards to ensure that a contract is binding, clear to ensure that the contractor understands what is to be done and how to do it, and technically correct. Writing good criteria requires a specialized engineer. Years of training and experience are required to obtain the "wordsmith" skills necessary to accomplish the grammatical requirements.

Unfortunately, the workload is so great that most engineers' writing criteria become trapped in the office environment; they never get the opportunity to develop the technical expertise required. When a field engineer moves into a criteria job, time is not available to keep current in technical areas. As a result, too often we have a cadre of criteria personnel with only part of the skills required.

The "NEESA Approach"

Early in the project game, we recognized the importance of criteria and evaluated our skills and deficiencies. We had an abundance of technical skills; we thought that writing criteria would be easy. Wrong assumption. Working with skilled writers at NAVFAC and the EFDs, we developed the writing skills required. When we felt that we were ready to take on criteria assignments, we sold a new idea to the NAVFAC managers. Our approach follows:

1. Nobody is identified as a "criteria engineer." Instead, criteria are assigned to project engineers with responsibilities for jobs that normally use the criteria.
2. Mistakes are acceptable. When a problem is identified that criteria changes can correct, we have the responsibility and "right" to inform users immediately by whatever means is necessary to ensure corrections are made before similar problems arise. We are not restricted to programmed review cycles.
3. Project engineers review criteria impact continuously during the course of a project. When criteria problems are discovered, the responsible criteria engineer is informed and changes are made.
4. Criteria are a central part of the project cycle and handled as such. Involvement in the project design review cycle is highly valued by engineers at the Naval Energy and Environmental Support Activity (NEESA). As a result, it is continuously evaluated and corrected.

The Result

Like most new assignments and new approaches, the product has both good and bad outcome. Overall, the method works well. We immediately learned that the project engineer is in the best position to find criteria deficiencies and is the best person to do something about it. We demonstrated that the engineering and design criteria system is the ideal place to get changes made so that mistakes are not repeated.

Other lessons we learned are: First, we found that contractor's lawyers are the best reviewers. Unfortunately, they do the review when it is too late to help a particular job. But, they often say, "If you wanted this done, you should have said the following." They also are very good at finding inconsistencies and loopholes. We take the information provided and fix up the criteria for the next job.

Second, ROICCs are an excellent source of criticism. If asked, they will usually tell us, "Your guide specification caused me the following problems."

Third, only a project engineer is in the position to fully assess the impact of the criteria on the project. This individual must be intimately involved with the project from design through acceptance.

Fourth, we underestimated the time for a typical engineer to become fluent in "specese." This caused delays and missed dates, but the results were worth the effort required.

Fifth, morale of the professional staff is markedly improved. Job satisfaction and sense of professional worth are greatly increased when a project is satisfactorily completed and our project engineer can stand back and say with pride, "I had a major part in that success." □

Year of testing completed on first hybrid solar/wind energy system

By JERRY THOMAS
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The U.S. Navy, a pioneer in the development of hybrid power technology, has completed a successful year of testing its first combination hybrid solar/wind energy system.

Two sources of alternative power — two 20 kilowatt (kW) wind generators and a photovoltaic array of 1,400 panels — have been providing a constant supply of electricity to the Naval Underwater Systems Center, Tudor Hill, Bermuda, displacing the use of expensive oil-generated electricity. When the hybrid energy supply exceeded the requirements of the 45,000 square foot building, the surplus was fed automatically into the Bermuda public utility distribution network.

Installed and monitored by the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif., the system's performance during the full climatic cycle which ended this spring has encouraged the Navy to pursue a more ambitious hybrid power program, designed to further decrease the use of fossil fuels and to reduce costly energy bills.

LCdr. Amy Doggett, officer in charge at Tudor Hill, said the facility, situated atop a knoll along the ocean, offers "lots of sunshine and wind" (16 miles per hour yearly average) to determine the hybrid system's capability to produce a viable source of electricity.

"Since we rely upon commercial power, we're pleased to take advantage of on-site power generated from renewable sources. We have saved an appreciable amount of money using the hybrid system," Doggett said.

For example, Tudor Hill's average electric bill is $4,000 a month. In March 1987, the hybrid power system provided enough energy to earn a $700 credit on the Center's bill.

During the 10-month period ending April 1987, the wind generators produced more than 65,000 kW hours of energy, worth $11,000 on the Bermuda utility market. This was accomplished despite the necessary fine-tuning and adjustments of machines and equipment to meet the unique climatic conditions of the site.

As a direct result of the successful Bermuda effort, NCEL this summer will start testing a group of wind turbines in a clustered configuration at San Clemente Island off the Southern California coast. Dharam Pal, senior research mechanical engineer at NCEL and head of the Navy's Hybrid Power Systems Technology, said the initial phase will consist of six 20 kW wind turbines installed on 80-foot towers.

The total installation cost of the test machines will be financed through venture capital under lease arrangements with a contractor. The lease payments to the contractor will be based upon the Navy's purchase of power from the turbines for 10-1/2 cents per kilowatt hour, compared to the prevailing cost of 25 cents per kW hour.

When fully operational, the six test machines will provide up to eight percent of the island's power needs, Pal explained, for an annual savings of $20,000. The winds at San Clemente average 15 miles per hour.

Using performance data from the Bermuda project, Pal envisions the installation of energy-saving hybrid systems at remote naval facilities which now rely on diesel generators for electrical power. He said that hybrid power is a cost-effective alternative at sites where the high cost of transporting expensive fossil fuel increases the cost per kW hour of electricity. A second important factor is the high cost of commercial energy, if available.

Pal said the Navy has approxi-

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A pair of 20 kW wind generators stand as sentinels over an array of photovoltaic cells at a U.S. naval facility in Bermuda.

Inconsistent contract terminology: a problem in need of a solution

By LT CHRISTOPHER MOSSEY
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Awarding and administering contracts for the government can be very complicated. With the morass of laws, regulations, directives, policies, and strong suggestions created by everyone from congressmen to clerks, contracts are destined to be complicated . . . and anything complicated is bound to have its share of problems. Besides the usual difficulties with over-regulation, poor contractors, or bad specifications, there is another big problem.

For years, we haven't used consistent "contract terminology." This problem is so big, we don't even know how to talk about it! We have so many "contract terms" floating around it takes years just to figure out that we have at least twice as many terms as we have things to describe. Often, we're talking about the same things, we just don't know it!

For example, consider the following hypothetical situation: An officer in charge (OIC) uses *formal advertising* to award a *lump sum BOS* contract to augment the *open-end maintenance service contract* at his base. After contract performance begins, the OIC attempts to negotiate a *change order* to the *SOW*, but is unable to reach agreement with the contractor, so he uses an *informal contract* to procure the additional service.

Every italicized term in the above paragraph is either outdated, unique within the Naval Facilities Engineering Command (NAVFAC), or ambiguous. To varying degrees, however, all of the above terms are still in use today throughout NAVFAC contracting organizations and probably will be for quite a while longer. We need, however, to begin to use accepted procurement terms if we are to be credible with our "procurement overseers" as well as other procurement groups within the government.

Since the implementation of the Federal Acquisition Regulation (FAR) in April 1984, a major side benefit has been a standardization of terminology throughout the federal government, including the Navy and NAVFAC. Previously, if a contract specialist changed jobs within the federal government, he or she might have to learn an entirely new professional language to perform the new job. This was even true if the job change was within the Navy, for example between Naval Supply (NAVSUP) and NAVFAC, despite the fact that NAVSUP and NAVFAC acquisition is governed by the same laws. DoD regulations, and Navy regulations, the terminology used in each System Command (SYSCOM) was often substantially different.

The P-68 changed dated January 6, 1986, did away with many NAVFAC-grown contracting terms and is more in line with the FAR. For example, all of the italicized terms in the second paragraph above are obsolete or outdated:

Formal Advertising — The Armed Services Procurement Act, the law which gives the Navy the authority to enter into contracts, originally defined the term "formal advertising" in 1947, and we have used it for almost 40 years. "Formal advertising" described the rigid process of contractors submitting sealed bids in response to an "invitation for bids." When Congress revised the Armed Services Procurement Act in 1985, it used a new term, "sealed bidding," to describe the same solicitation process we have been principally relying on for years.

Lump Sum Contract — Lump sum is a NAVFAC term. It is descriptive, since in a lump-sum contract, the contractor gives the government **one** lump-sum price for the entire scope of work, which is accepted or rejected as a unit. If there are no modifications to the contract by the end of the contract, the contractor will have received the lump-sum amount. Although the term "lump sum" may be descriptive, the FAR calls such contracts "firm fixed price," and to prevent confusing contractors (not to mention ourselves), the P-68 change retired the term.

BOS Contracts — The best example of a base operating support (BOS) contract is at Subbase Bangor, where virtually all base services, including public works, are provided by one contractor. However, as time has passed, we have used the term to describe contracts that include all public works functions, and most recently, to describe any large facility support contract that includes more than one function. A more descriptive term, and of course the one that the FAR uses, is "multifunction contract."

Open-End Contract — The term "open end" is still used in many contract offices. Unfortunately, open end is a NAVFAC term. Information on "open-end contracts" cannot be found in the FAR. The FAR term for open-end contracts is indefinite de-

livery. When using an indefinite-delivery contract, the goods or services are ordered as needed over the contract's period, not to exceed some maximum quality or dollar amount. The actual amount ordered under the contract, therefore, is "open ended," which is why that term persists today.

Maintenance Service Contract — When public works officers (PWOs) started accomplishing work that used to be done with in-house forces by contract, the first "maintenance contract" was created. As time passed, these contracts were also called service contracts and then maintenance service contracts. These names were perfectly adequate, since in general the contracts were for maintenance which is usually a service. But some thought the PWO/OIC was awarding three different types of contracts. Then some PWO/OICs started awarding and administering open-end (oops, indefinite delivery) construction contracts for painting. Since these contracts were administered by the activity, rather than the area ROICC office, a separate term, "maintenance construction contracts" was created to prevent confusing these contracts with the ROICC's construction contracts, These terms helped to prevent confusion! With the P-68 change, NAVFAC has gone back to two types of contracts: service or construction. If a service or construction contract happens to be for continuing public works support, then within NAVFAC it is called a facility support contract.

Statement of Work (SOW) — This term was used to describe the specification for facility support contracts. Perhaps because "SOW" was already used to describe female pigs, it was replaced by PWS, which stands for performance work statement.

Change Order — As the term has been commonly used, a change order is any "modification" to a contract (i.e., any change issued on a Standard Form 30). The term "change order," however, has a very specific meaning in the FAR: it is a change that the government orders unilaterally under the "changes" clause (See FAR 43.101). If the unilateral "change order" is later agreed upon by both parties, it is then called a "supplemental agreement," again according to the FAR. Unfortunately, "supplemental agreement" has been traditionally used to describe an "out-of-scope change order." A FAR term to describe an "out-of-scope change order" doesn't exist. "Out-of-scope change orders" are really sole source procurements, accomplished by a firm already under contract for an unrelated procurement because it's convenient.

Informal Contract — An "informal contract" is not a casual contract that doesn't have procurement regulations. There are procurement regulations for everything! For procurements under $25,000, however, section 13 of the FAR outlines special "small purchase" procedures to reduce the amount of time and administrative burden required to procure goods or services. Depending on which EFD the contracting office reported to, an informal contract was under $2,000, $2,500, or $10,000. The term is no longer used in the P-68, and there is no such thing as an "informal" contract (ask a PMR team!).

Besides effective communication, there are other good reasons to be sure we use consistent FAR terminology when working with contracts. Many of the critical clauses in our contracts are verbatim from the FAR. Obviously, for example, if we use the term "change order" in a different sense than the clause, problems will result. There are many other examples.

We must be precise in our terminology because contracts are confusing and complicated enough. We need to be able to speak the same language as the rest of the Navy procurement establishment, oftentimes in self-defense. In the meantime, we should all pledge to resist the temptation to create a new term until we're sure it hasn't already been created elsewhere, especially in the FAR! □

First hybrid energy system

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mately 180 sites where winds average 10 miles per hour. They are prime candidates for hybrid power. It is estimated that if wind generators were installed Navywide, energy savings would equal 1.5 million barrels of oil a year, equivalent to a 10 percent reduction in the use of primary energy sources.

Pal added that this winter the Navy will begin earning a 20 percent discount on wind-generated power at Tudor Hill, for an annual savings of approximately $3,600.

One wind generator is 100 feet high, the other is 80 feet. Each has three 15-foot blades. Both machines produce an average of approximately 12-1/2 kW of power a year, or 110,000 kW hours of energy a year.

The adjacent 56 kW array of photovoltaic cells has been operating at Tudor Hill since 1983. This solar component of the hybrid energy system was installed by the Navy in cooperation with the Department of Energy's Federal Photovoltaic Utilization Program. The array is the largest developed under the program.

Frank Casteel, senior mechanical engineering technician on all NCEL wind projects, said the hybrid energy system was fully instrumented to record wind speeds, ambient temperatures, relative humidity, wind and solar output, and solar insolation. Twelve months were needed to collect the required performance data because the solar and wind components of the system had to undergo a full climatic cycle. He said that long-range reliability studies pertaining to corrosion will be completed in 1989.

Pal revealed additional plans for larger Navy hybrid power projects at Exmouth, Australia, where the Navy operates a communications facility, and at Adak, Alaska. Each site has the potential for wind farms with peak outputs of 3,000 kilowatts. Site analysis at Exmouth will start this fall. A working wind farm of 150, 20 kW generators should be operational by 1990, Pal said. This system of alternate power will supply up to 25 percent of the Navy's power requirement, for an annual savings of $200,000. □

Cost-plus award fee—a panacea?

By LT DAVID M. COLEMAN
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Cost-plus-award-fee contracting may seem like a panacea to those embroiled in fixed-price contracts, mainly because they are perceived to offer the flexibility of effortless and cost-free change orders, the freedom to purchase whatever materials are desired, the elimination of disagreements over contract provisions, and the ability to choose a good contractor. In practice, these perceptions are partially true, but the benefits are accompanied by increased government effort, since the Navy contract administrators become responsible for cost control and evaluation of the contractor's performance. The following paragraphs report the various pros and cons of a cost-plus contract, based on experience with the U.S. Navy's cost-plus-award-fee construction contract for facilities on the British Indian Ocean Territory of Diego Garcia. This $450 million contract spanned six fiscal years and provided construction of 105 separate facilities.

A cost-plus contract was chosen for the Diego Garcia project since mobilization had to occur quickly, and the extremely remote location and tight timeframe necessitated contract award before plans and specifications were complete.

These factors would have caused very high financial risks for a fixed-price contractor, so the government made a business decision to use a cost-plus contract and thereby assume a greater portion of the risk.

Changes to a cost-plus contract must be thoroughly defined

This particular contract has presented many unique problems, but the following observations are major facets of any cost-plus-award-fee contract.

Changes to a cost-plus contract are by no means effortless. They must still be thoroughly defined, evaluated, funded, and documented. Even though the dollar value of a change order represents an estimated cost, it is necessary to arrive at a reasonable amount. Changes are added to the baseline figure of negotiated cost, and this baseline is compared to actual construction costs, as one indicator of the contractor's performance.

When new projects are added to the contract, the construction costs, along with potential fees, are added to the baseline. These changes must be negotiated and supported by board reports or business clearances, just like fixed-price changes. Cost-plus contract changes are simpler since financial risks are shared, but the processing effort is only slightly reduced compared to fixed-price contract changes.

Purchases of construction materials and services must be controlled by the Navy management staff to ensure the contractor pays reasonable prices. This is achieved by requiring the contractor's purchasing department to follow Federal Acquisition Regulations. This necessitates extensive monitoring of the contractor's procurement activities and thorough review of their purchase orders to ensure compliance.

All purchase orders must be either competitively bid or conclusively documented as warranting a sole source. As a result, good prices are obtained, but the contractor loses the ability to purchase familiar products from proven sources. This may seem a hindrance, but the cost-plus contractor has the ability to help ensure the specifications are updated and unambiguous before purchase orders are issued.

Thorough inspections are necessary to ensure work is done correctly the first time

As with fixed-price contracts, the quality of purchased products depends directly on the clarity of the procurement specification.

Disagreements over contract provisions still arise, and enforcing the provisions of a cost-plus contract presents a unique cost management problem for field personnel. Since all costs are reimbursable, except those incurred through deliberate negligence, the Navy field staff must conduct thorough inspections to ensure the work is performed correctly the first time.

With reimbursement of material costs, the contractor has little incentive to substitute inferior materials, so these inspections are aimed primarily at construction methods rather than material compliance.

When a deviation from plans or specifications is discovered, a decision must be made whether to accept the existing work or reject it, since directing re-work means the government would end up paying for the initial and the corrected work. Although the ramifications are different, questions concerning contract provisions arise in cost-plus contracts just as they do in fixed-price contracts.

Source selection is one advantage of cost-plus contracting. Since prospective contractors are judged

primarily on past performance and demonstrated capabilities rather than a fixed-price proposal, the project planners have control of source selection. The criteria are qualitative vice quantitative, and a top-notch contractor can be selected. However, this alone does not ensure a smooth running project.

Many of the contractor's internal workings are controlled by the government, and the application of these controls has a direct impact on the contractor's effectiveness. A team effort is required in a cost-plus contract, and the Navy administrators have a direct responsibility for a successful project.

Cost control and financial management are performed by the Navy's accounting staff since the cost-plus contract increases the government's financial risk. For example, when the contractor submits an invoice, it must be reviewed to confirm all costs are allowable and reasonable. Also, cost trends must be monitored and final costs predicted to ensure approved funding limits will not be exceeded.

Since a cost-plus contract is a negotiated procurement, the Navy's accounting staff must perform internal audits and respond to Defense Contract Audit Agency evaluations. They must also direct and monitor the proper distribution of costs to the various government accounts. These functions are necessary measures of cost control not required by a fixed-price contract.

The contractor's performance must be monitored by the Navy management staff, and findings periodically presented to an Award Fee Evaluation Board. This is a critical function, since the board determines what percentage of the maximum award fee the contractor will be paid. The award fee is the contractor's motivation to strive for excellence in all aspects of construction, and the contract must provide an objective basis for measuring their performance.

The Diego Garcia staff accomplishes this by formulating and monitoring specific goals for each critical facet. Establishing a fair system for performance evaluation is an ongoing task unique to cost-plus contracts.

Compared to a fixed-price contract, the cost-plus contract has several advantages and disadvantages in the areas of contract changes, purchasing, enforcement of contract provisions, source selection, and evaluation of the contractor's performance.

It is not a panacea, but can be an excellent vehicle for construction in difficult situations. Cost-plus contracts are a useful tool in facilities procurement, but should be used only with compelling reasons, such as those which convinced the Navy to use a cost-plus contract for construction on Diego Garcia. □

A/Es in construction contracts

(Continued from page 13)

It may not be critical, however, if a change or amendment to the contract is not accomplished by a formal change order. For instance, if the contractor does not feel that he/she will incur cost and performs the work without notifying the government, if he/she has confirmed the no-cost change in a letter to the government, or he/she signs a no-cost field change.

This is usually the case in many of the changes to the contract because most are so insignificant that not much more is needed. However, as pointed out, the limitations are there and the discretion of the engineers on how to use them is critical in proper negotiations.

Changes to construction field contracts must be determined early to minimize costs, and the responsibility is on the engineers to determine that there will be a technical as well as an administrative effect on the contract, and ensure that proper personnel are involved with the solution.

We have seen that the architect/engineer follows certain requirements in preparing and changing contract documents; however, the authority in enforcing them is limited. The engineer's authority lies in making decisions of facts. When it comes to questions of law, and this necessarily includes the interpretation of the contract and contract documents, the court takes the position that a party always has the right to submit a legal dispute to a court of law.

Therefore, we can see how the architect/engineer has to strictly observe the criteria before writing or changing of contract documents. These undertakings must be followed with the utmost of care on the part of the architect/engineer to prevent subsequent litigation not only to himself or herself, but to all involved.

Conclusion

The architect/engineer and knowledge of law is important in every construction contract, because no two construction jobs are identical. Caution must be practiced about what is included in contracts, and how they are arbitrated. Each contract is special and while other contracts and specifications may be referred to, they must not be used without thinking the problem through with an adequate background in legal duties and responsibilities.

If a certain word or clause is questionable, find out what it means before including it! There are too many instances of this sort, which have cost not only someone's reputation, but also hundreds of thousands of dollars expended through unnecessary costly change orders or claims.

It is, therefore, of prime importance to ensure that all architects and engineers who deal with any facet of the construction effort — whether it be design, inspection, management, etc. — take action to ensure that they are trained in the legal aspects of contractual requirements. They should also be made aware of the fact that they, not the legal technicians, have the greatest responsibility for the accuracy, constructability and the final product of all construction projects. □

advice of counsel

By RALPH LOMBARDO
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In the previous "Advice of Counsel" (*Navy Civil Engineer,* Spring 1987) Mr. Mahn explained that environmental laws affect Navy planning, and in some instances may impede the Navy's ability to proceed with some programs "where there has been a failure to adhere to applicable environmental legal constraints." It is important to realize that applicable environmental regulation exists in the body of state as well as federal law.

Whether or not a specific state environmental regulation is applicable to the Navy depends on an analysis of the Constitutional doctrine of Sovereign Immunity. The United States Supreme Court, in a number of cases, opined that the federal government, while acting in a governmental capacity, is free from regulation by any state. In a historic U.S. Supreme Court case, *M'Culloch* v. *Maryland* (1819), the concept of sovereign immunity was derived from a study of the Supremacy clause of the Constitution. That is, laws made pursuant to the Constitution are supreme, they control the laws of the respective states and cannot be controlled by the states.

In later Supreme Court cases, the court further explained that this immunity from state law will only be lifted where Congress affirmatively, clearly and unambiguously declares its instrumentalities or property subject to state regulation. Such a waiver of sovereign immunity will subject the federal government to only that state regulation which falls within the scope of the waiver.

Waivers of sovereign immunity are common throughout federal environmental statutes. They appear in the Clean Water Act, Clean Air Act, Safe Drinking Water Act, the Superfund Amendments and Reauthorization Act as well as many others. These waivers are not all written the same and cannot be similarly interpreted. For example, Section 6001 of the Resource Conservation Recovery Act requires certain federal activities to comply with "all federal, state, interstate, and local requirements, both substantive and procedural (including any requirements for permits or reporting . . .), . . . including the payment of reasonable service charges. . . ."

In contrast, the Superfund Amendments and Reauthorization Act of 1986 states more generally at Section 120(a)(4) that "State laws concerning removal and remedial action, including State laws regarding enforcement, shall apply to removal and remedial actions at facilities owned or operated by . . . the United States when such facilities are not included on the National Priorities List."

As you can see, because of the difference in the scope of these provisions, the question as to whether a specific state regulation applies to a Navy activity or operation cannot be answered generally. This decision can only be made after a careful legal analysis of the provisions of the state law as compared to the scope of the sovereign immunity waiver that may govern a particular instance.

In order to minimize the impact of state regulation on the Navy's operations, two types of actions, both preventive and reactive, are necessary when a question of state law arises. Many states, as well as the federal government must give the public an opportunity to comment on a regulation being proposed. This is where preventive action is important.

The Navy, as a party potentially affected by the new provision, has the ability to and *should in every instance* provide comments to the state regulatory agency involved. In this way, the Navy's objections or support of the proposal becomes a matter of public record to be considered by the state in the final promulgation of the rule.

The effect of these comments may prevent an unnecessary legal battle when the timing of an operation becomes critical. In addition, this "commenting" action will give the activity a heads-up and a better understanding of the coming regulation, and when applicable, an early start in preparing for its impact.

Where a state is attempting to enforce an existing environmental regulation on the Navy, a proper initial reaction is important. Reaction to state enforcement must be coordinated with the installation, activity, or engineering field division's counsel's office. While only Congress can waive sovereign immunity, the history of the Navy's actions in regard to compliance with a specific state law may be weighed by a court in assessing how the Navy has *interpreted* the waiver of immunity.

When this question arises, please provide counsel a copy of the exact language of the regulation along with all copies of any communications with the state. This will enable counsel to conduct the necessary legal analysis and assess the state's position in deciding whether or not the law applies and if negotiations should be commenced to minimize its potential impact.

In summary, keep informed of what is happening in the state regulatory arena. Careful and systematic review of state notices in official publications and local newspapers will prevent a surprise from occurring at an inconvenient time. When enforcement is attempted, coordinate with counsel so that all actions are consistent with the law as well as legal positions that have already been asserted by the navy in similar circumstances. NAVFAC Counsel's office at headquarters and all field offices (EFDs and PWCs) are ready to provide the legal analysis and support necessary in this very complex area of law.

'Win-win-win' for AROICCs

By LT CHRISTOPHER K. COLES
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Robert Ringer's *You Can Negotiate Anything* popularized the idea of "Win-Win" solutions in two-party negotiations where both parties can get what they want, and both feel that they "won." The junior Civil Engineer Corps (CEC) officer assigned as an Assistant Resident Officer in Charge of Construction (AROICC) faces a more complex dilemma. The AROICC must ensure that problems are creatively solved in such a way that the customer gets what they need. Usually, this means a convenient, low-maintenance, trouble-free facility.

The "3-W" or "Win-Win-Win" approach places the customer in the middle of the problem and engages their help in finding the solution. Very often, this approach will lead to a much cheaper, faster, and more satisfying fix than those initiated by the professionals because the user has a clear and intuitive idea — based on experience and intimacy with the facility — of what is needed.

This intuition can never be matched by the professionals; however, they must process it into a plan of action in light of the desirable and technically feasible based on their own design and field experience.

As a further motivation (the "stick to go with the carrot") any "you lose" outcome for the customer or contractor can eventually become an outcome where you, the AROICC, also lose.

WIN-WIN-WIN

The 3-W approach is not a procedure, it is an attitude. The 3-W attitude: "I, and I alone, am responsible to find a solution to this problem by integrating my customer's facility needs, my need to properly discharge my stewardship of public trust, and the contractor's need to earn a profit."

Without this integration of all three sets of needs, the solution will only be temporary. You will have traded a minor short-term problem for a more serious long-term problem.

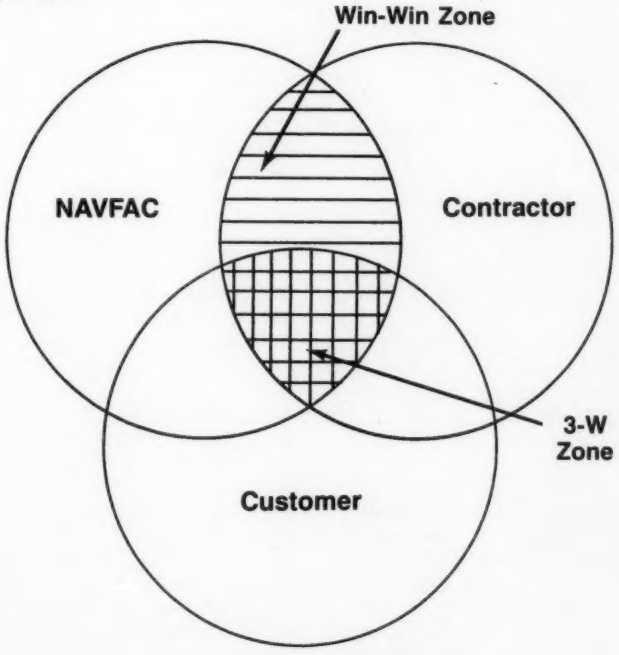
The customer *is* our mission. By serving their facility needs, we increase readiness and improve American force posture. Too often we interpret our mission as being "get WIP" or "good construction" or "comply with the plans and specs." This self-focused attitude misses the point that we, NAVFAC, are only servers of the Navy's real producers, the fleet and air operating forces.

THE 3-W APPROACH

Most bilateral negotiations can end using Ringer's Win-Win solution in the AROICC's context. One pathetic figure always loses because he/she never plays. True, the NAVFAC side has the customer's best interests at heart, but still has more vital points to make.

The possibilities are much more complex when another party has joined. The field of satisfactory outcomes appears to have narrowed, but the customer's participation helps to ensure that more outcomes are investigated and the most satisfactory of *all* concerned is then chosen.

The implications of the various outcomes are shown graphically below.



Three-win solutions

FINDING A 3-W SOLUTION

3-W solutions require three ingredients: active listening, hard work, and creativity. Oddly, each follows from the other.

Active listening *is* hard work; it requires one human to listen to another without talking much. As though that were not hard enough, it also requires that the listener understand the feelings and desires of the speaker. There is an old saying among salesmen, If you want to know why John Smith buys, try to see with John Smith's eyes. This is the key. What does the customer want? What does the contractor want? What does the contract specialist want? Well, you can ask them, but odds are they will not tell you the whole story. As the technical and contracting professional, you may need to interpret much of what they tell you into a feasible plan.

This is where creativity comes in. In the active listening process, we try to decipher into our technical terms what the customer needs in physical usage of their facility, what the contractor needs in terms of money, time or access, and what NAVFAC needs contractually.

In this type of problem-solving exercise, it is likely that many more intangibles are involved than tangibles described in the contract documents. And usually the intangibles are much more "negotiable" than tangibles. When the active listening is done, the best solution is often obvious, then the AROICC will have to do something slightly unusual — something that was unexpected before the listening began — that no one else thought of. Our examples below highlight in bold face the "creative act," which may seem mundane, but were crucial in the solution process.

OPPORTUNITIES

This is not to say that we can solve all problems without a change order. On the contrary, many problems cannot be solved without one. Unforeseen conditions, design deficiencies, and changes in scope very often *demand* a change order.

For the AROICC not to recognize when a change is necessary is exemplary of poor problem-solving and poor knowledge of contracting principles. Indeed, when a change order is required, the AROICC has the greater opportunity to adjust both intangible and tangible needs, simply because it is a formalized problem-solving venue.

3-W EXAMPLES

1. **Problem:** A design overlooked the fact that realigning a drop ceiling would place some sprinkler heads above and some below the ceiling.

Some Win-Win solutions where the customer loses:

a. Ignore the problem — customer has ugly pipes hanging down, and lack of fire protection.
b. Adjust ceiling height to sprinkler heads — customer has varying ceiling height; too low in in some places, too high in others. Unpleasant architectural effect.
c. Tell PWO to do it himself — PWO gets mad, says it's OICC's fault and we should fix it. We have to admit that's true and our reputation suffers — So does customer's trust in us.

Win-Win-Win Solution: ***Call field division F/P engineer*** and get quick verbal OK to make minor adjustments to piping. Write contractor a change order.

2. **Problem:** Rainy season is approaching, and a contractor is behind schedule on a hanger reroofing and repair. VP-00 needs the hangar to protect valuable aircraft during high winds. The contractor is slowed by the need to dismantle his massive structural scaffold every time he moves to a new repair area. Win-Win solution where the customer loses: Proceed per plans and specs.

Win-Win-Win Solution: Allow contractor to ***remove existing light fixtures*** at no cost so his scaffold can be moved by jacking and rolling, rather than piece by piece. Contractor can meet original schedule because of faster moves. Lights were to be removed and replaced under another contract. Deduct demolition of existing fixtures from other contract. Customer was willing to get along with portable lighting until next contract.

Contracting Comment: As part of the contract, removing lights was (slightly) out of scope. As a temporary construction method, removal of lights to effect timely completion was not a scope issue.

3. **Problem:** A storage area for musical instruments at a DODD School had been subject to pilferage in the past. In a new band building under construction, the storage area had a security door. But the school principal acutely identified that a pilferer could enter through the drop ceiling, since the metal-stud partition wall ended at the ceiling. Some Win-Win solutions where the customer loses:

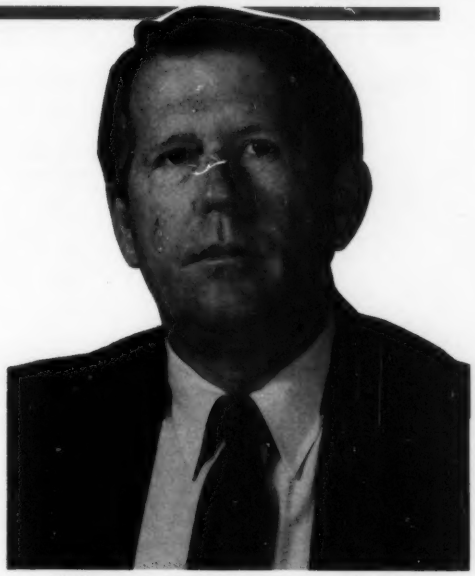
a. Proceed per design. This makes the customer hate us over a $2,000 problem even if we bring his $2.5 million project in on schedule with immaculate quality.
b. Tell the contractor to put the partition above the ceiling and write a change later. The auditor will nail us.
c. Do a proper supplemental agreement. This will take a long time, especially since DODD headquarters has a "no customer-requested change orders" policy in effect.

Win-Win-Win Solution: The inspector realizes that in our locality CHB wall is cheaper per square foot than a gyp-board partition with metal studs. A *no-cost field change* is issued to provide a CHB wall from floor to roof. A government estimate showed equal costs for the two partition systems when the slightly higher CHB area is taken into account.

Contracting Comment: The security door clearly indicates that the storage area is meant for high-value items. Just as clearly, the easy access for pilferage through the ceiling was an oversight unintended by the designer. Provision of a CHB wall vice gyp-board complied with the intent of the design.

Conclusion: Customer relations is more than brainwashing or force-feeding. To be done well it requires listening, work, and understanding. And, surprisingly enough, the customer turns out to be right a good deal of the time. And they're more important than us, any day! □

Ronnie E. Harvey



Naval Construction Training Center
Special Schools Department
Gulfport, Mississippi

Specialty: Disaster Recovery

Ron Harvey is an instructor at the Naval Construction Training Center (NCTC), Gulfport, Miss., where he teaches all phases of disaster recovery, including: chemical, biological and radiological defense (CBR-D) and basic rescue to approximately 600 students and command center staff personnel each year.

Having served with the U.S. Navy Seabees for twenty years and one of the original plankowners of the Construction Training Unit (CTU), as it was named when commissioned in 1967, now NCTC), Harvey has been a civilian member of the NCTC training staff twice since his retirement from the U.S. Navy.

Prior to Harvey's retirement from the Navy, he served two tours of duty in Vietnam, and many different assignments including: Naval Mobile Construction Battalion 9, 121, and 133.

Since his retirement, he has worked for NAVFACENGCOM's Disaster Recovery Training Department (DRTD). While at DRTD, he gained many valuable experiences in the disaster recovery field by training personnel in DRT skills all over the world.

In 1983, Harvey was selected as NAVFAC's representative for the Nuclear Weapons Exercise NUWAX 83 conducted at the Mercury, Nevada, test site.

With more than ten years teaching experience already, Harvey continues to prepare himself for further roles in the training field by pursuing a bachelor of science degree in industrial and vocational education at the University of Southern Mississippi.

Ronnie Harvey was born in Meridian, Miss., and enlisted in the U.S. Navy (Seabees) in 1961. He is married to the former Miss Thordis Jonsdottir of Keflavik, Iceland, and they have four sons, Hal, Larry, Bob, and Ronnie.

When not engaged in sports with his sons and homework, he enjoys boating and fishing. Harvey is a member of the Veterans of Foreign Wars, the American Legion, Shriners, and Masons. His future plans include graduating from college and taking a long vacation in Europe.

Naval Construction Training Center, Gulfport (NAVCONSTRACEN) provides courses of instruction in advanced and basic training for all the Seabee rates. The schools can be attended by all the members of the American Armed Forces, foreign military or civilians. Over 9,000 students graduate yearly with 19 formal courses and 164 special construction battalion training (SCBT) courses offered. The NCTC staff averages eight officers, 20 civilians, and 185 enlisted personnel assigned to conduct training, support curriculum development, and to administer student affairs.

The mission of the Naval Construction Training Center, Gulfport, is to administer those courses and special training programs assigned by the Chief of Naval Education and Training, to train enlisted and officer personnel to prepare them for early usefulness in their designated specialties, and to supplement on-the-job training by providing advanced or specialized training when such training can be more advantageously given in a formal course.

By BU1 PHILIP J. FLEMING

The junior officer tour: a fast-paced 24 months!

By LTJG J. R. VAN DE VOORDE
CEC, USNR
P.E., Calif.
Officer in Charge
Construction Battalion Unit 417
NAS Whidbey Island, Washington

The junior officer tour in a Naval Mobile Construction Battalion is a fast-paced 24 months. Almost immediately you find yourself in charge of Seabees and expected to exercise command in a military situation, probably a field exercise (FEX). As engineers, we are confident of our skills and professional knowledge; however, as infantry officers, we are surely less so.

Our first FEX might find us with only two weeks of military training at the Naval School, Civil Engineer Corps Officers (CECOS) and perhaps an additional week at a Naval Construction Regiment (NCR).

While providing the basics of military training, these two or three weeks are not enough to provide the junior officer new to a battalion with the entry level skills and background needed. The answer is a self-study correspondence program offered by the U.S. Marine Corps Institute.

The program is the Basic Officer's Non-Resident Course and consists of 12 correspondence courses totaling 104 student-hours of effort. Building on the basic of CECOS military training, completion of this program ensures a basic understanding of the following areas:

Marine Corps History and Traditions
Techniques of Military Instruction
Map Reading and Land Navigation
Nuclear, Biological, and Chemical Warfare Defense
Supporting Arms
Combat Intelligence
Communications
Tactics Fundamentals
Rifle Platoon in the Offense
Rifle Platoon in the Defense
Advanced Tactics
Amphibious Operations

The parallels between Marine and Seabee military training make virtually all of the above relevant to the Naval Construction Force. Each course is presented in a separate book which can be retained by the officer for future reference.

I did not discover this program until I transferred out of a battalion, but as officer in charge of a Construction Battalion Unit I found it to be outstanding refresher material, as well as good professional knowledge of how Marines operate.

For junior officers new to a battalion or soon on their way to become one, the basic course is an outstanding opportunity to build military skill level and "hit the ground running," confident to lead Seabees in military operations.

Completing this course, as well as other Navy correspondence courses, can only help a junior officer's professional development and enhance his or her promotability within the Corps.

Considering the short-tour duration of a junior officer in a battalion, which usually consists of two but sometimes just one full deployment, commanding officers of battalions might consider such a course as required material for the professional development of their junior officers.

To enroll in the course, simply write to the U.S.M.C. Institute, Marine Barracks, Box 1775, Arlington, VA 22222, and request that you be enrolled in the Basic School Non-Resident Program or check with your educational services officer at your command concerning the U.S.M.C. Institute Catalog. □

43 accept assignments in field

Forty-three members of basic class no. 183, graduated on September 4, 1987 from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. The class completed eight weeks of specialized training pertinent to the Navy's needs for shore installation engineering, public works management, and Seabee operations.

Seven class members finished with honors: Lt. Douglas P. Tomlinson was the outstanding graduate.

Graduating with distinction were Ensigns Darius Banaji, Robyn D. Eastman, Jerry L. Hollister, Cherlynn E. Moes, Danny A. Nygaard, and Steven R. Wolfe.

Lt. Tomlinson's photograph is indicated by an (*), and those graduating with distinction are indicated by a (•). Those entering Seabee duty are indicated by a (†).

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Ens. William D. Angeloni
BSAE/U.S. Naval Academy
to PWC Great Lakes, Ill.

Ens. Natalie Bobrovsky
BSCE/Cornell Univ.
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BSCE/The Citadel
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speaking from topside

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tional areas during the first twenty or so years of their careers.

Contract Specialists?

A recent "threat" of our becoming a corps of specialists took place in a review of NAVFAC's contracts administration program four years ago when NAVFAC initiated a study to investigate ways we could improve management and administration of contracts. The study revealed that the magnitude of contracting was greater than generally believed and the types of contracts more numerous. Although NAVFAC was administering contracts satisfactorily, doing better was possible and necessary. Three main conclusions were drawn: (1) NAVFAC personnel (military and civilian) required more intense and broader training; (2) compartmentalization of functions was inhibiting good administration (management, maintenance, operations, design, and contract administration needed to be integrated; and (3) *the CEC career pattern should not be altered.*

NAVFAC has taken action to improve contract administration, realigning Headquarters and engineering field divisions to more closely integrate product lines. NAVFAC HQ has delegated substantially more authority to the field based upon their increased capabilities and qualifications. Throughout NAVFAC all 02 codes now report directly to the Deputy or Vice Commander. NAVFAC has brought itself into compliance with the requirement for warranting is required for PWOs who administer the full range of contracts as well as the OICC/ROICC who administer construction contracts. Individual warranting is mandating more structured training and experience, and NAVFAC has developed an extensive and structured training program (NFCTC) to fulfill its training requirements.

Military billets have been created and filled in NAVFAC 02 codes in headquarters and in the field—an ideal way to broaden CEC officer experience in contracts administration. NAVFAC is reorganizing in the field to implement the study recommendation to consolidate contract administration into a single office, generally under the PWO, to coordinate and administer all forms of contracts. Fortunately, NAVFAC is continuing its detailing policies to comply with the third conclusion of the "Cowden and Quinn Study"—*that the CEC not alter career patterns* to have CEC officers assigned in one specialty track throughout their career.

Mobilization

My thesis has been constructed, thus far, in a peacetime context. In my lifetime, the Navy has been involved in three major wars (WW II, Korea, and

continued on page 32

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to OICC, Guam

speaking from topside

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Vietnam), with hostile engagements of less duration and impact interspersed. CEC officers have been involved in each.

In war and peace the Civil Engineer Corps needs a distribution of officers in public works, contract administration (OICC), Seabees, and staff billets. In WW II, Korea, and Vietnam, CEC public works manning was 2 to 3 times greater than that of "OICC" manning, although most PWOs were "double-hatted" as ROICCs. Upon future mobilization, the distribution of CEC billets is projected to be about the same relative distribution as in the past.

Peacetime billets serve as a cadre of mobilization. In WW II, well over half of the CEC officers served in the Seabees. Is there any reason to believe that there will be a different emphasis if we mobilize again?

CEC Officer Viewpoint

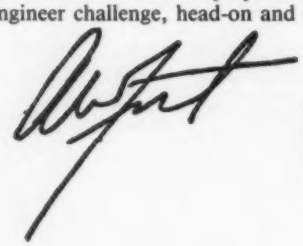
The typical CEC officer probably feels that contract administration is fun, but recognizes that a well-rounded career with duty in OICC, Public Works, Seabees, and staff, is desired. Most CEC officers remain in the Navy because of the comprehensive facilities engineering experience afforded to them and the opportunity to have duty in different geographic areas. CEC promotion boards heretofore have also favored officers with a broader background because of the greater potential they offer the Navy and the increased flexibility in detailing made possible by their generalized background vice a specialized background. The Navy and NAVFAC benefit from the cross-fertilization and innovation brought about by rotating officers through billets and functional areas.

Conclusion

I firmly believe that a Civil Engineer Corps of "generalists" is needed to meet today's demands as well as to be prepared for mobilization. The nature of our billet structure and the fact that we are a small corps of professionals demand that junior officers be exposed to all functional types of duty as early as possible in their careers to be prepared to be qualified for the multi-functional assignments they will be detailed to as senior officers.

While appealing to a few, no doubt, I believe that mandatory specialization would adversely affect recruiting and reduce retention of the best CEC officers.

I urge that we continue our proud heritage as a highly competent, well-rounded, deeply professional cadre of naval officers prepared to meet any civil engineer challenge, head-on and successfully.



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AV 794-2650/4322

Lt. James Bolling
Central Region, RNCF
Bldg. 1, Naval Base
Great Lakes, IL 60088
Phone: (312) 688-6955/6
AV 792-6955/6

LCdr. Jerry Mason
Western Region, RNCF
1220 Pacific Highway, Bldg. 131
San Diego, CA 92132
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